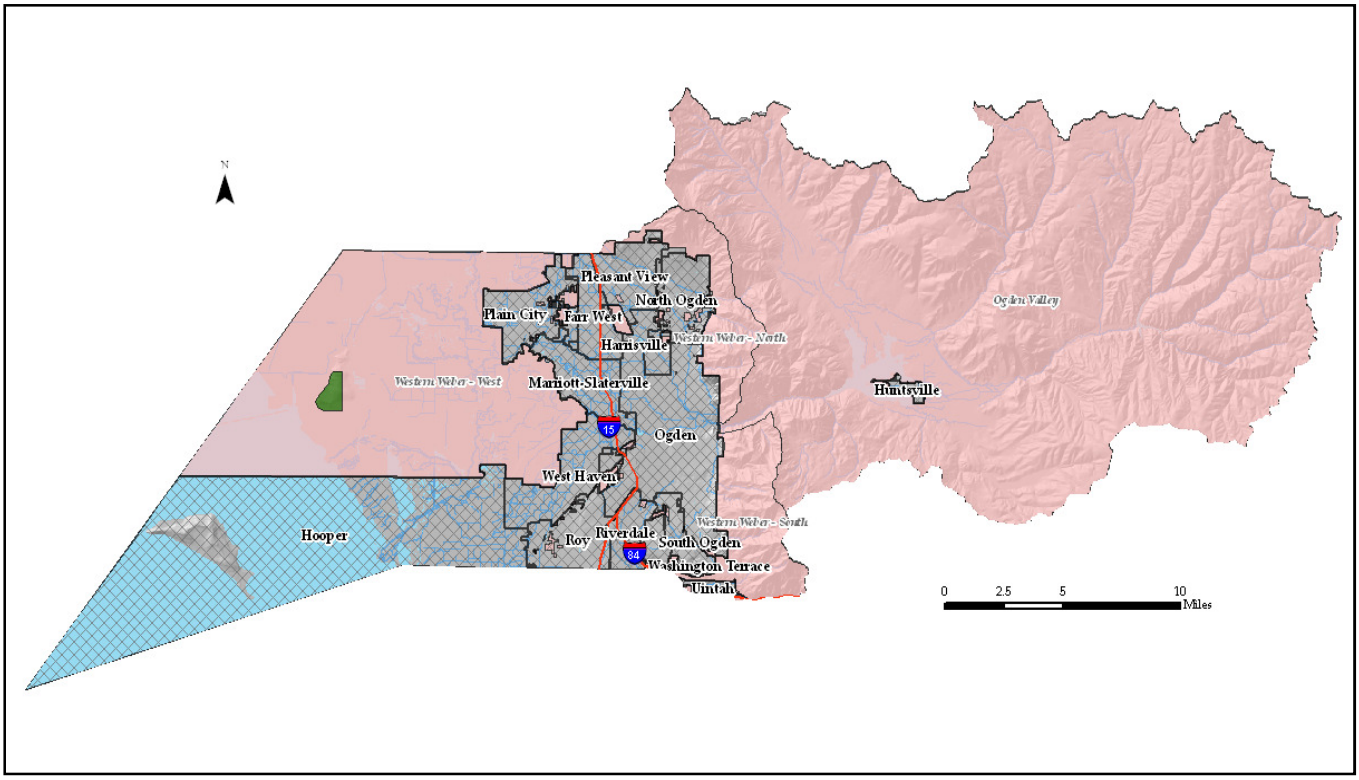



**Map 13-1. Weber County**

# Part XIII. Weber County

Weber County includes fifteen municipalities: Farr West, Harrisville, Hooper, Huntsville, Marriott-Slaterville, North Ogden, Ogden, Plain City, Pleasant View, Riverdale, Roy, South Ogden, Uintah, Washington Terrace and West Haven. Ogden, Utah's sixth largest city is the county seat for Weber County and a transportation hub for northern Utah. Seven unincorporated communities can also be found in Weber County: Eden, Liberty, Nordic Valley, Taylor, Warren, West Warren and West Weber. Weber County encompasses a total of 644 square miles, composed of the following land ownership categories: Private lands 73.6%, Federal Government 18.2%, State Government 8.3%, Military and Bankhead Jones land 1.0%. Much of Weber County is considered to be a high alpine mountain valley. However, the western portion is a flat fertile plain formed by alluvial deposits from ancient Lake Bonneville.

Weber County experienced a growth of population of approximately 1.5% per year between 2000 and 2006, 1% below the state average (Utah Population Estimates Committee). Growth appears to be slowing as Weber County grew by only 1% in 2006 primarily due to negative net migration (UPEC 2007). Weber County is projected to almost double in population by the year 2050 (UPEC 2008).

The Weber County job market slowed in the early part of the decade due to a nationwide recession, but now appears to be recovering. The recession of 2008 will likely result in a major economic downturn for the entire region. The 2006 jobless rate was 3.3% for the county, down from a peak of 6.5% in 2003 (UDWS 2006). Unemployment has waned despite increasing population growth rates.

Twenty percent of private sector jobs are in the "goods producing" industry of construction and manufacturing, while eighty percent of all other workers are in the "service industries" of transportation, trade, finances, services and government (UDWS 2006). Per capita income in 2005 was $29,688 and the average monthly non-farm wage for 2005 was $2,474 (UDWS 2006). Weber County's largest employers are identified in Table 13-1.

| Company | Industry | Employment |
|---|---|---|
| Internal Revenue Service | Federal Government | 5,000-6,999 |
| Weber School District | Public Education | 3,000-3,999 |
| Weber State University | Higher Education | 2,000-2,999 |
| Autoliv | Motor Vehicle Equipment | 2,000-2,999 |
| McKay-Dee Hospital Center | Health Care | 2,000-2,999 |
| Fresenius USA Mfg. Inc. | Medical Instrument Manufacturing | 1,000-1,999 |
| Convergys | Telephone Call Center | 1,000-1,999 |
| Wal-Mart | Discount Department Store | 1,000-1,999 |
| State of Utah | State Government | 1,000-1,999 |
| Ogden School District | Public Education | 1,000-1,999 |

**Table 13-1. Largest Employers, Weber County** (UDWS 2006)

## Hazard History

Identifying past hazard events provides a starting point for predicting where future events could potentially occur. The following historical hazard event statistics were consolidated from the Spatial Hazard Events and Losses Database for the United States (SHELDUS) of the Hazards and Vulnerability Research Institute. This database records reported natural hazard events which cause greater than $50,000 in damages. Monetary figures are in 2005 dollars (Figures 13-1 and 13-2).

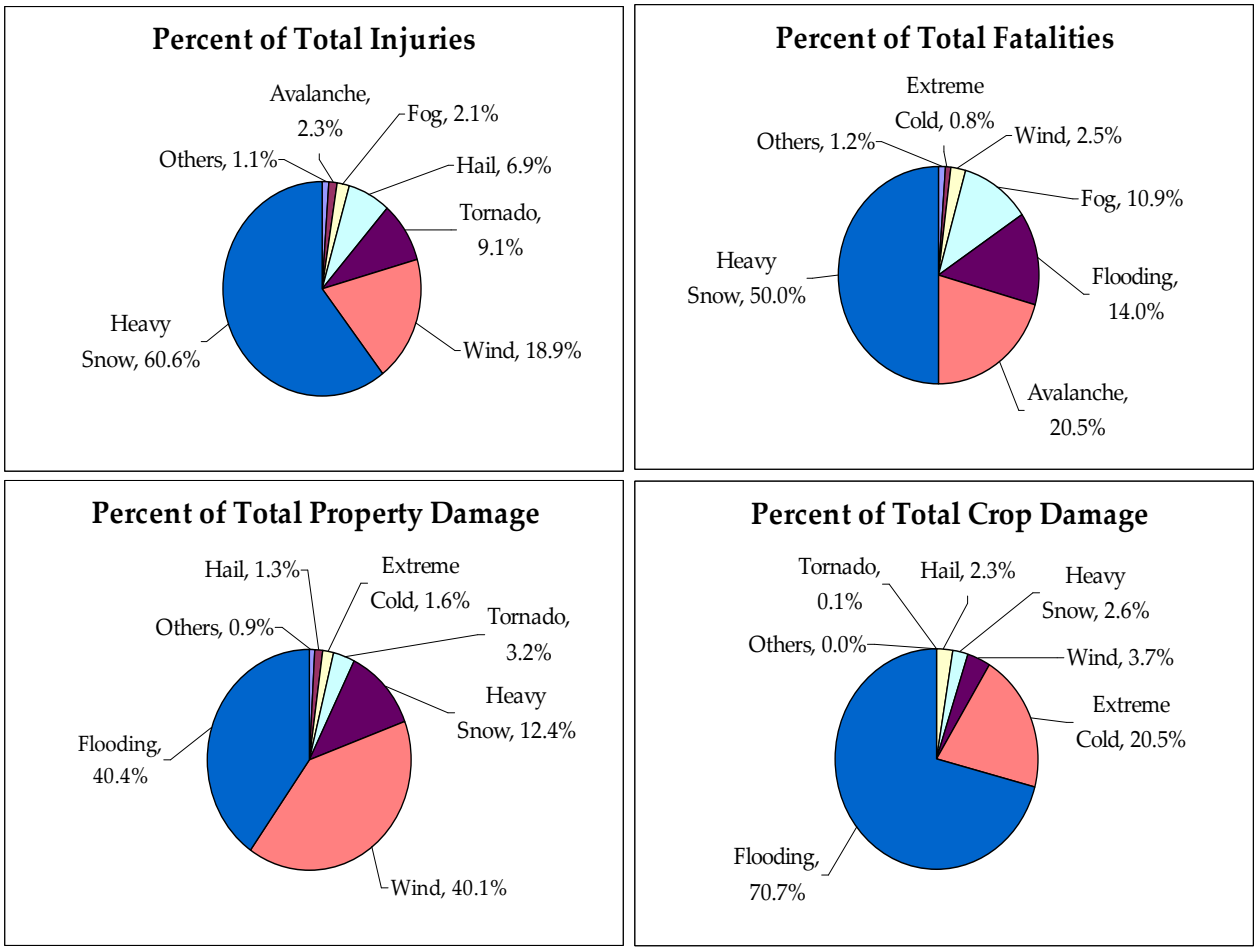



**Figure 13-1. Major Disaster Event Averages 1962-2005, Weber County** (HVRI 2007)

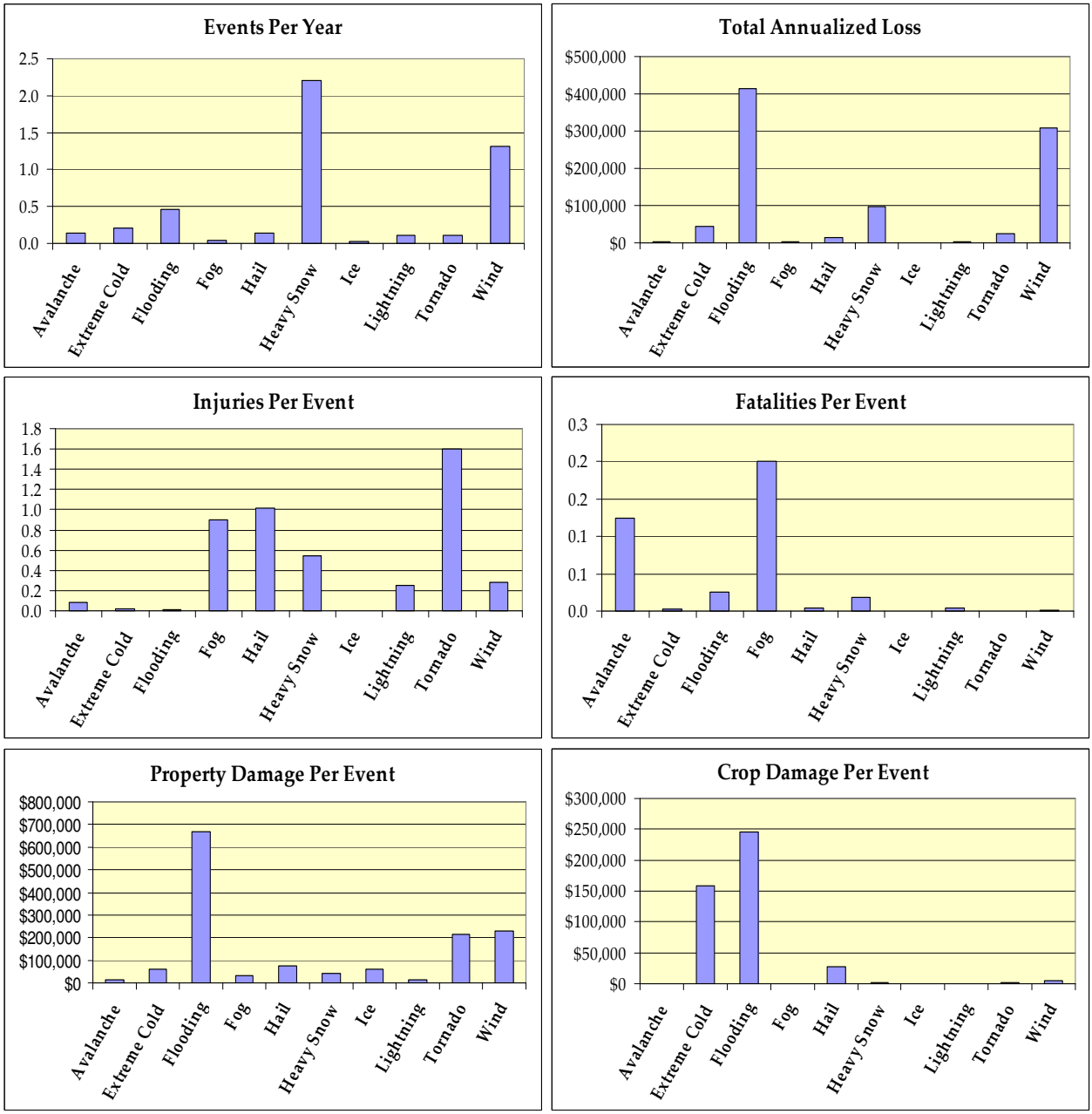



**Figure 13-2. Major Disaster Average Annual and Per Event Statistics 1962-2005, Weber County** (HVRI 2007)

## Risk Assessment

The risk assessment process revealed the following for Dam Failure, Earthquake, Flood, Landslide/Slope Failure, Liquefaction, and Wildland Fire. Drought, Infestation, Radon and Severe Weather are considered to be regional hazards and can be found in Part VIII. Refer to Part VII for an explanation of the risk assessment methodology. According to this data, there are a total of 140 identified critical facilities within Weber County. For the complete list refer to Appendix D.

| Number of Structures with Moderate or Greater Vulnerability (% of Total) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Critical Facilities** | **Total** | ***Dam Failure*** | ***Flood*** | ***Earthquake*** | ***Liquefaction*** | ***Problem Soils*** | ***Slope Failure*** | ***Wildfire*** |
| **Amateur Radio Repeaters** | **4** | 0 (0%) | 0 (0%) | 4 (100%) | 1 (25%) | 0 (0%) | 4 (100%) | 0 (0%) |
| **Public Safety Repeaters** | **10** | 0 (0%) | 0 (0%) | 10 (100%) | 0 (0%) | 0 (0%) | 0 (0%) | 5 (50%) |
| **Electric Generation Facilities** | **3** | 3 (100%) | 3 (100%) | 3 (100%) | 1 (33%) | 3 (100%) | 3 (100%) | 3 (100%) |
| **Emergency Operations Centers** | **22** | 8 (36%) | 6 (27%) | 22 (100%) | 8 (36%) | 8 (36%) | 1 (1%) | 0 (0%) |
| **Fire Stations** | **20** | 6 (29%) | 0 (0%) | 20 (100%) | 12 (60%) | 0 (0%) | 0(0%) | 0 (0%) |
| **Hospitals** | **2** | 0 (0%) | 0 (0%) | 2 (100%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (%) |
| **Police Stations** | **10** | 3 (50%) | 6 (36%) | 10 (100%) | 6 (36%) | 6 (36%) | 0 (0%) | 0 (0%) |
| **Schools** | **68** | 13 (19%) | 8 (12%) | 68 (100%) | 40 (59%) | 10 (15%) | 3 (1%) | 2 (1%) |
| **Water Treatment Facilities** | **2** | 2 (100%) | 2 (100%) | 2 (100%) | 1 (50%) | 2 (100%) | 0 (50%) | 1 (50%) |

**Table 13-2. Critical Facilities Vulnerability Matrix for Local Hazards, Weber County** NA=Not Applicable

## 1. Earthquake

### Hazard Profile

| | | | | | |
|---|---|---|---|---|---|
| ***Potential Magnitude*** | X | ***Catastrophic (>50%)*** | ***Probability*** | | ***Highly Likely*** |
| | | ***Critical (25-50%)*** | | X | ***Likely*** |
| | | ***Limited (10-25%)*** | | | ***Possible*** |
| | | ***Negligible (< 10%)*** | | | ***Unlikely*** |
| ***Location*** | Ground shaking will be felt throughout the entire county. Surface fault rupture can be felt in areas of known historic fault zones. Liquefaction can be expected in areas of high to moderate liquefaction potential. | | | | |
| ***Seasonal Pattern*** | There is no seasonal pattern for earthquakes. They can occur at any time of the year or day during any or all weather conditions. | | | | |
| ***Conditions*** | Liquefaction potential within high ground water table areas. Soil that is comprised of old lakebed sediments. | | | | |
| ***Duration*** | Actual ground shaking will be under one minute, aftershocks can occur for weeks or even months. | | | | |
| ***Secondary Hazards*** | Fire, landslide, rock falls, avalanche, flooding, hazmat spills, building collapse, loss of utilities. | | | | |
| ***Analysis Used*** | Review of hazard analysis plans and other information provided by the University of Utah Seismograph Station, UGS, USGS, DHLS, AGRC. | | | | |

### Description of Location and Extent

In northern Utah, the Wasatch Fault Zone is an active fault zone that can produce a large 7.3-75 Richter magnitude earthquake on average every 300-400 years. The Weber Segment of the Wasatch Fault Zone includes the area along the eastern edge of the valley between North Salt Lake and Willard Bay. The Weber Segment has produced four large earthquakes over the past 4,000 years making it one of the most active fault segments (UGS 2002). The Weber segment of the Wasatch Fault could potentially create a magnitude 7.0 or above earthquake which would be very damaging to the entire county.

Two major earthquakes have struck the Ogden City area with a Richter magnitude between 5.0 and 5.5 since 1894. Weber County has also felt earthquakes that did not have their epicenters within the county. According to the Weber County Emergency Operations Plan, in 1962, an earthquake along the Cache fault produced a 5.7 Richter magnitude earthquake. Others include a 6.0 earthquake in the Pocatello Valley along the Hansel Valley Fault in 1975, another on the same fault in 1934 with a magnitude of 6.6, and yet another in 1909 with a 6.0 magnitude. For locations of all earthquakes centered within Weber County since 1962, see Map 13-2 (page 292).

One of the better measures of earthquake destruction potential is spectral acceleration. 0.2 spectral acceleration represents the frequency at which the most potential damage can occur in one- and two-story buildings, while 1.0 spectral acceleration represents the frequency at which taller buildings potentially will see greater damage. Maps 13-3 (page 293) and 13-4 (page 294) respectively show 0.2 and 1.0 spectral acceleration for a 2500-year event in Weber County. The potential forces exerted on buildings are shown as a percentage of the force of gravity with 100% equaling one times the force of gravity.

Western Weber County is located atop the ancient Lake Bonneville lake bed, which is made up of very weak soils. The area is also subject to shallow ground water and a relatively high earthquake threat. The secondary threat, liquefaction associated with an earthquake could have a higher impact on this portion of the county than the surrounding areas. For a further explanation of liquefaction, see Map 13-5 (page 295). See also the regional hazard identification section for further explanation of liquefaction.

| Name | Fault Type | Length (km) | Time of Most Recent Deformation | Recurrence Interval |
|---|---|---|---|---|
| Bear River Range faults | Normal | 63 km | 1320-3420 years ago | 1,000-100,000 years |
| East Great Salt Lake fault, Fremont Island section | Normal | 103 km | 2939-3385 years ago | 4,200 years |
| Ogden Valley fault, Northeastern Marginal section | Normal | 13 km | < 1,600,000 years ago | Unknown |
| Ogden Valley fault, North Fork section | Normal | 26 km | < 750,000 years ago | Unknown |
| Ogden Valley fault, Southwestern Marginal section | Normal | 18 km | < 750,000 years ago | Unknown |
| Wasatch fault, Brigham City section | Normal | 37 km | 2100±800 cal yr B.P | 1300 years |
| Wasatch fault, Weber section | Normal | 56 km | 950±450 cal yr B.P. | 1400 years |

**Table 13-3. Weber County Quaternary Faults** (UGS 2002, Lund 2005) cal yr B.P. = calendar years before present

## Vulnerability Assessment

Vulnerability to earthquake in Weber County was obtained from the modeling program Hazards United States – Multi-hazards (HAZUS-MH)**. The following numbers were based on a probabilistic 2500-year event with a Richter magnitude of 7.1 as well as an arbitrary 5.9 event located in close proximity to the county's most populated areas. These locations and magnitudes were chosen for their likelihood and proximity respectively. Default HAZUS-MH inventory for all infrastructure was used. (***For a more detailed explanation of the loss estimation methodology of HAZUS-MH MR2, please see Part VI or the HAZUS-MH Technical Manual (Earthquake Model) at www.fema.gov/hazus*).

### Building Damage

HAZUS-MH classifies building damage into five levels: none, slight, moderate, extensive and complete. Table 13-4 lists the number of buildings by occupancy estimated to sustain moderate to complete levels of damage. Also listed are the estimated monetary losses to structures, contents/inventory, and income.

| Category | Number of Structures with > 50% Damage | | Category | Estimated Losses | |
|---|---|---|---|---|---|
| | Weber M5.9 | 2500-yr M7.1 | | Weber M5.9 | 2500-yr M7.1 |
| Residential | 9,628 | 36,944 | Structural Losses | $121,246,000 | $606,962,750 |
| Commercial | 402 | 921 | Non-Structural Losses | $427,644,000 | $2,131,644,450 |
| Industrial | 94 | 233 | Content Losses | $160,762,000 | $683,297,620 |
| Government | 36 | 78 | Inventory Losses | $5,829,000 | $30,625,560 |
| Education | 15 | 35 | Income and Relocation Losses | $134,323,000 | $537,906,150 |
| **Totals** | **10,175** | **38,211** | **Totals** | **$849,804,000** | **$3,990,436,530** |

**Table 13-4. Building Damage Counts and Estimated Losses**

**Transportation and Utilities Damage**

Damages to transportation and utility infrastructure are in Table 13-5. Infrastructure sustaining moderate or worse damage and estimated monetary losses are both shown.

| Category | Total | At Least Moderate Damage >50% | | Estimated Losses | |
|---|---|---|---|---|---|
| | | Weber M5.9 | 2500-yr M7.1 | Weber M5.9 | 2500-yr M7.1 |
| Waste Water Facilities | 2 | 1 | 2 | $18,503,000 | $62,682,000 |
| Waste Water Pipelines | 1,561 km | 248 leaks/breaks | 4,095 leaks/breaks | $888,000 | $14,740,000 |
| Potable Water Facilities | 1 | 0 | 1 | $1,460,000 | $11,423,000 |
| Potable Water Pipelines | 2,601 km | 312 leaks/breaks | 5,177 leaks/breaks | $1,123,000 | $18,637,000 |
| Natural Gas Pipelines | 1,040 km | 264 leaks/breaks | 4,377 leaks/breaks | $950,000 | $15,757,000 |
| Electrical Power Facilities | 1 | 0 | 1 | $1,401,000 | $28,244,000 |
| Communication Facilities | 12 | 4 | 10 | $110,000 | $398,000 |
| Highway Bridges | 141 | 17 | 100 | $6,188,000 | $52,408,000 |
| Railway Bridges | 5 | 0 | 3 | $7,000 | $161,000 |
| Railway Facilities | 1 | 1 | 1 | $597,000 | $1,043,000 |
| Bus Facilities | 2 | 1 | 2 | $587,000 | $1,055,000 |
| Airport Facilities | 1 | 0 | 1 | $1,262,000 | $2,637,000 |
| **Total Losses** | | | | **$33,076,000** | **$209,185,000** |

**Table 13-5. Damage to Transportation and Utilities**

**Debris Removal**

Table 13-6 shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour. A second debris removal issue is landfill space. Fifty thousand tons at a weight-to-volume ratio of one ton per cubic yard would cover more than ten acres to a depth of three feet.

| Category | Weber M5.9 | 2500-yr M7.1 |
|---|---|---|
| Brick, Wood & Others | 145,000 tons / 5,800 loads | 654,000 tons / 26,160 loads |
| Concrete & Steel | 287,000 tons / 11,480 loads | 1,401,000 tons / 56,040 loads |

**Table 13-6. Debris Generated/Number of Loads**

**Earthquake Caused Fires**

Multiple ignitions and broken water mains following an earthquake can make firefighting nearly impossible. HAZUS-MH uses estimated building damages, loss of transportation infrastructure and predictable winds to calculate the estimated area that would be burned following an earthquake. Table 13-7 estimates ignitions, people at risk and the building stock exposed to fires following an earthquake.

| Category | Number of Structures | |
|---|---|---|
| | Weber M5.9 | 2500-yr M7.1 |
| Ignitions | 11 | 14 |
| Persons Exposed | 146 | 239 |
| Value Exposed | $7,290,000 | $14,462,000 |

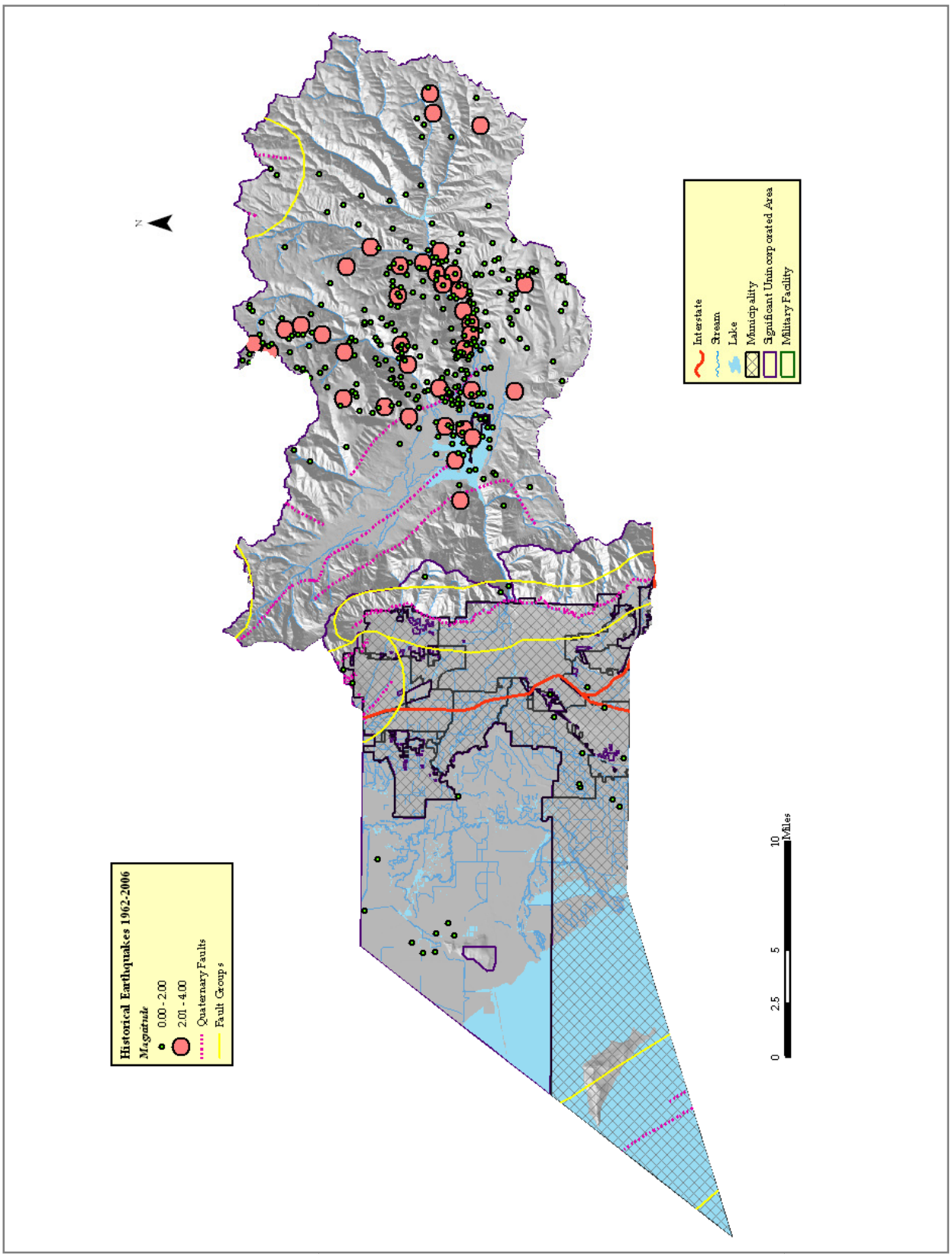
**Table 13-7. Fire Following Event, Population Exposed, and Building Stock Exposed**

**Casualties**

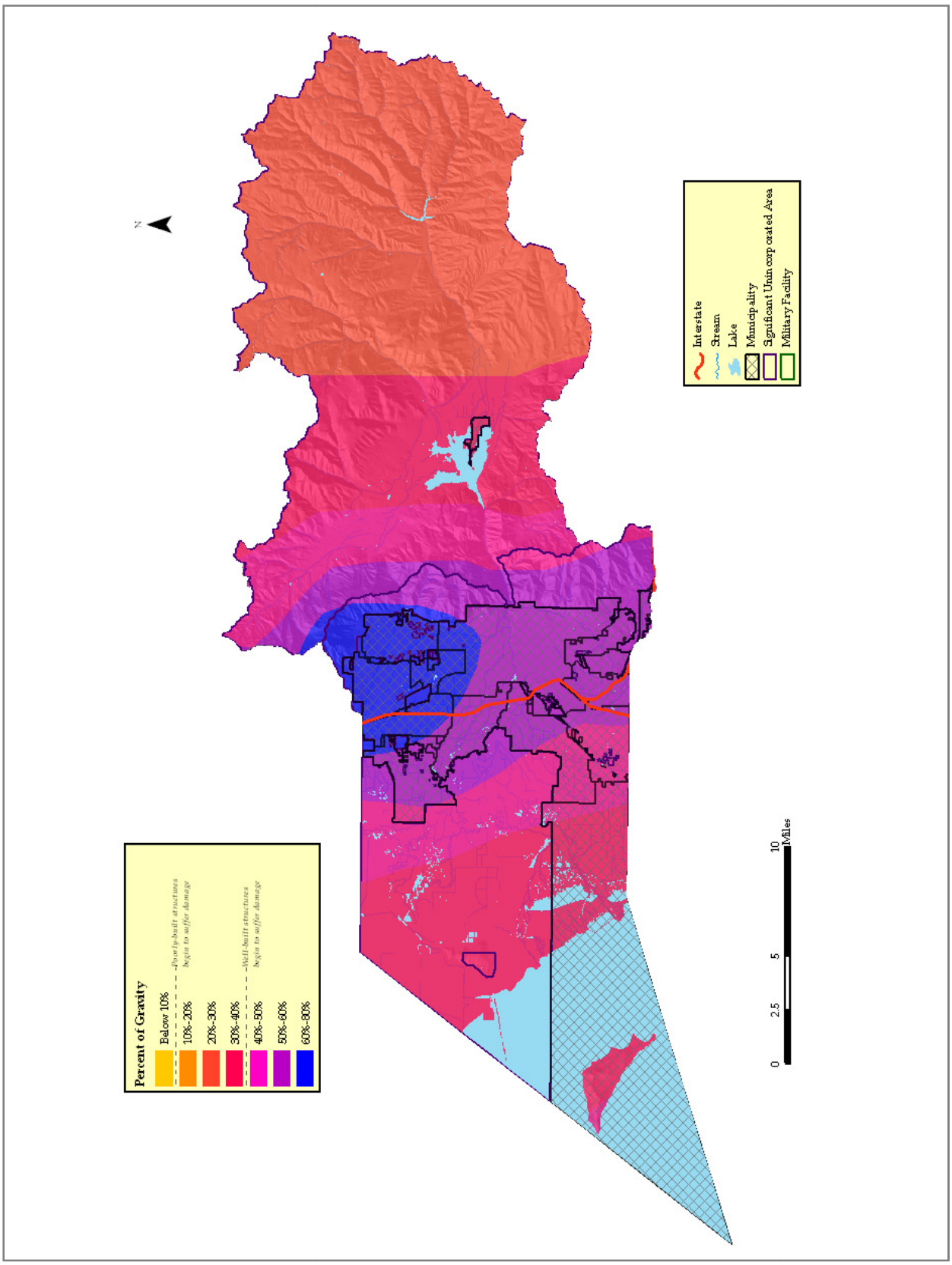
Table 13-8 estimates casualties likely to occur during each earthquake scenario. The nighttime scenario (2 a.m. local time) assumes a primarily residential concentration of persons, the daytime scenario (2 p.m. local time) a commercial concentration, and the commute scenario (5 pm. Local time) a concentration of persons on commuting routes. Categories of casualties include those not requiring hospitalization (minor), those requiring treatment at a medical facility (major), and fatalities.

| Night Event | Weber M5.9 | 2500-yr M7.1 | Day Event | Weber M5.9 | 2500-yr M7.1 | Commute Event | Weber M5.9 | 2500-yr M7.1 |
|---|---|---|---|---|---|---|---|---|
| **Minor** | 294 | 2,076 | **Minor** | 434 | 2,797 | **Minor** | 349 | 2,313 |
| **Major** | 67 | 636 | **Major** | 119 | 996 | **Major** | 93 | 793 |
| **Fatalities** | 14 | 150 | **Fatalities** | 29 | 276 | **Fatalities** | 22 | 210 |

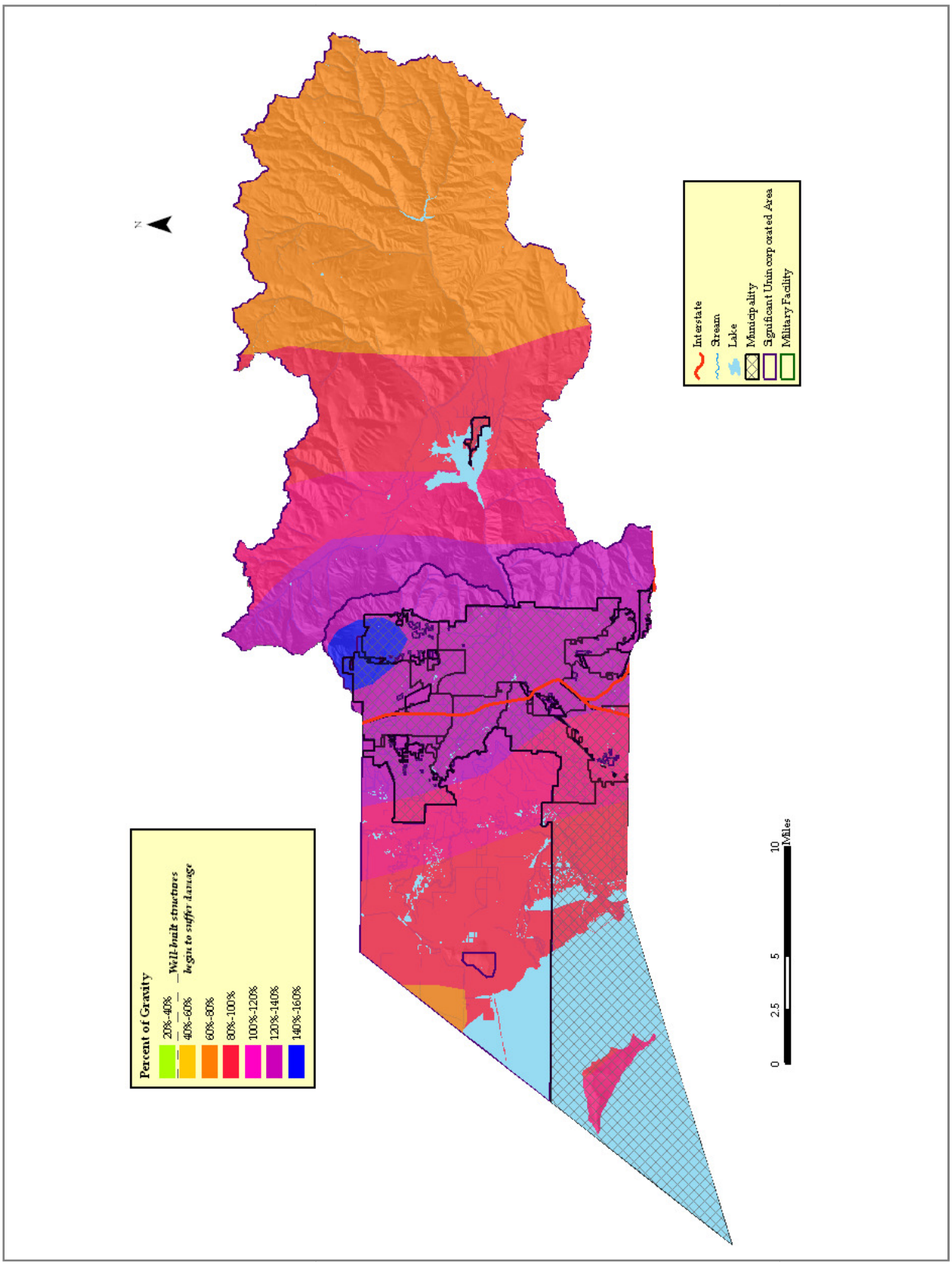
**Table 13-8. Casualties**



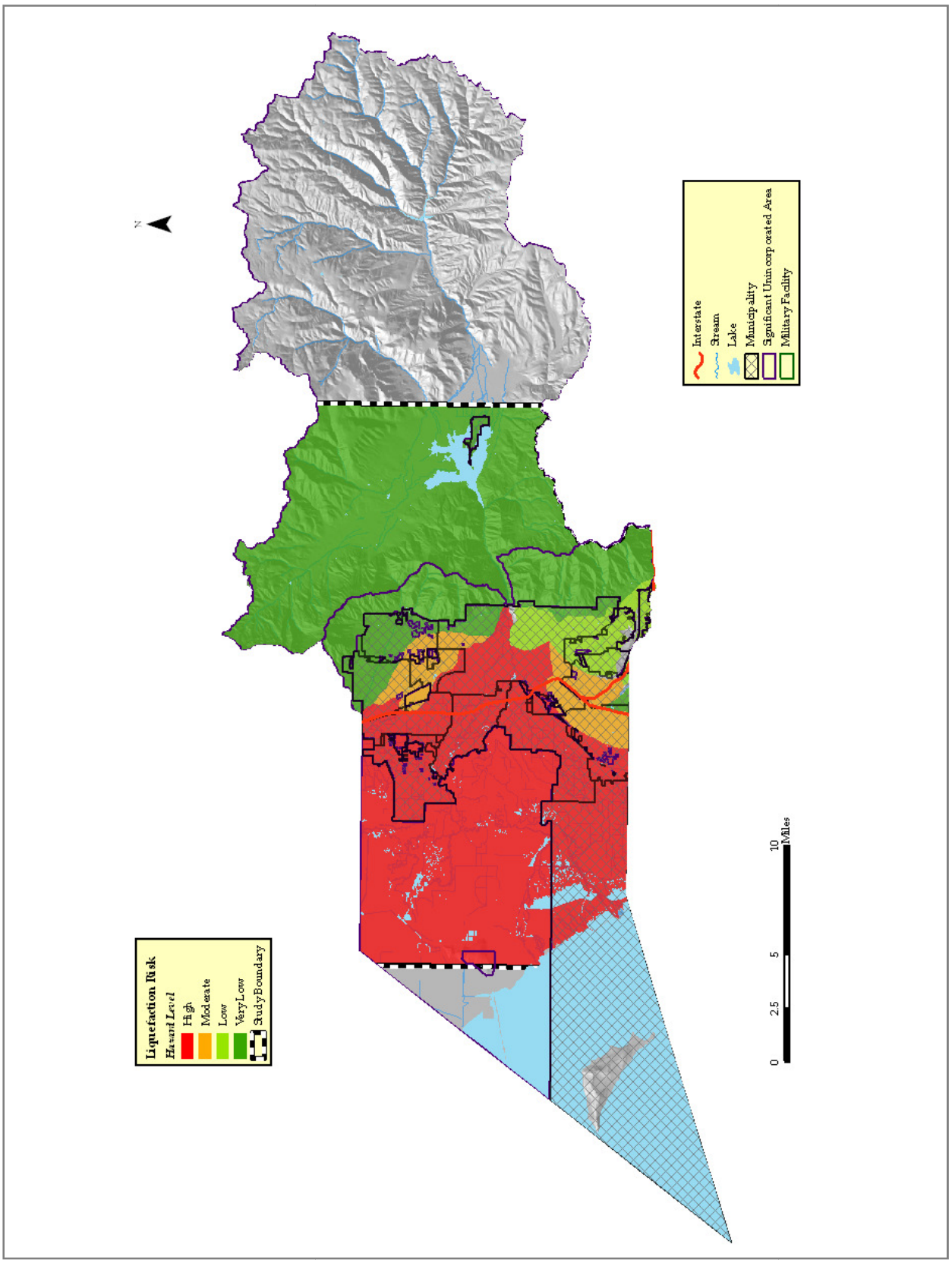

**Map 13-2. Historical Weber County Earthquakes, 1962-2006** (UUSS 2007)




**Map 12-3. 0.2 Spectral Acceleration, Weber County** (NSHMP 2002)




**Map 13-4. 1.0 Spectral Acceleration, Weber County** (NSHMP 2002)




**Map 13-5. Liquefaction Probability** (Christenson and Shaw 2008)

## 2. Flood

### Hazard Profile

| Potential Magnitude | | | Probability | | |
|---|---|---|---|---|---|
| | | *Catastrophic (>50%)* | | | *Highly Likely* |
| | | *Critical (25-50%)* | | *X* | *Likely* |
| | *X* | *Limited (10-25%)* | | | *Possible* |
| | | *Negligible (< 10%)* | | | *Unlikely* |
| ***Location*** | Alluvial fans, Great Salt Lake. | | | | |
| ***Frequency*** | Spring, Late Summer. | | | | |
| ***Conditions*** | Cloudburst Storms, extended wet periods. | | | | |
| ***Duration*** | Flooding can last anywhere from hours to days and even months. | | | | |
| ***Secondary Hazards*** | Raw sewage/health risk, electrical fires, gas spills. | | | | |
| ***Analysis Used*** | Review of FIRM, debris flow maps. | | | | |

### Description of Location and Extent

The greatest flood risk in Weber County is associated with long duration storms. A significant rain event on top of a heavy snowpack could also potentially cause localized flooding. Cloudburst storms generally result in flash flooding in localized areas. North Ogden has experienced flash flood events in the past fifteen years. Rapid snowmelt is another significant flood threat that results in unusually high runoff. Sheet flooding has occurred several times in the Upper Valley areas around Eden and Liberty.

The areas of greatest flood potential are within western Weber County, Ogden, and the Weber River in Uintah as well as in the flatlands in the western part of the County. The Weber and Ogden Rivers can experience flooding. However the dams on these rivers upstream help to mitigate the flood threat. Other smaller creeks that can create flood problems within the county include North Fork Ogden River, South Fork Ogden River, Taylor Canyon Creek, Wolf Creek, Sheep Creek, Waterfall Canyon Creek, Beus Canyon Creek, Burch Creek, Cold Water Canyon Creek, Four Mile Creek, Six Mile Creek and Hot Springs Creek. The Weber River drainage is approximately 2,460 square miles (Weber County 2000). The Warren area could experience flooding on agricultural lands and homes from the failure of the West Dike of the Weber River between 4700 West and 1100 South. In the past businesses and roads were damaged from flooding between 1990 West and 1300 South near SR89 in the West Haven area.

Three irrigation canals in Weber County affect the flood threat: the Ogden-Brigham Canal, the Weber-Davis Canal and the Willard Canal. The Weber-Davis Canal breached in 1999 and flooded over 70 homes in Riverdale. This event was declared as a city, county, and state disaster. The Ogden-Brigham Canal breached in 1979, due to a rockslide. Since 1853, the County experienced over 360 flash floods and more than 170 snow melt floods. The Willard Canal has the potential to cause considerable damage should it breach.

## Vulnerability Assessment

Vulnerability to flooding in Weber County was obtained from the modeling program Hazards United States – Multi-hazards (HAZUS-MH)**. Vulnerability was assessed for both 100-year (NFIP Zone A) and 500-year (NFIP Zone B or Zone X (shaded)) flood events. Analysis was completed using Digital Flood Insurance Rate Maps (DFIRM). Only streams which contained detailed flood cross-section data could be used. Flooding from the Great Salt Lake was also not included. Consequently, the results should be considered conservative. Total monetary losses include structures, contents and business interruption. (***For a more detailed explanation of the loss estimation methodology of HAZUS-MH, please see Part VII or the HAZUS-MH Technical Manual (Flood Model) at www.fema.gov/hazus).*

| | Acres Flooded | Population Displaced | Number of Structures in Floodplain | |
|---|---|---|---|---|
| | | | Residential Units (Total Losses) | Commercial/Industrial Units (Total Losses) |
| 100-year Flood | 845 | 1,789 | 378<br>$27,530,000 | 7<br>$30,570,000 |
| 500-year Flood | 1,695 | 1,966 | 407<br>$35,440,000 | 7<br>$43,800,000 |

**Table 13-9. Weber County Flood Hazard**

### Agricultural Losses

Agricultural losses are listed in Table 13-10. Losses are computed for the number of days the crops are inundated with water. All numbers are estimated for a flood occurring near April 15th.

| | 100-year Losses, Day 3 | 100-year Losses, Day 7 | 500-year Losses, Day 3 | 500-year Losses, Day 7 |
|---|---|---|---|---|
| Barley | $2,862 | $3,815 | $2,906 | $3,875 |
| Corn Silage | $30,110 | $40,146 | $27,769 | $37,026 |

**Table 13-10. Agricultural Losses, June 15th Scenario**

### Vehicle Losses

Table 13-11 contains losses for vehicles in floods during both daytime and nighttime scenarios. The scenarios assume ninety percent (90%) of vehicles being removed from hazard areas due to warning.

| Category | 100-year | 500-year |
|---|---|---|
| Daytime Scenario | $1,311,774 | $2,552,740 |
| Nighttime Scenario | $1,955,096 | $2,592,086 |

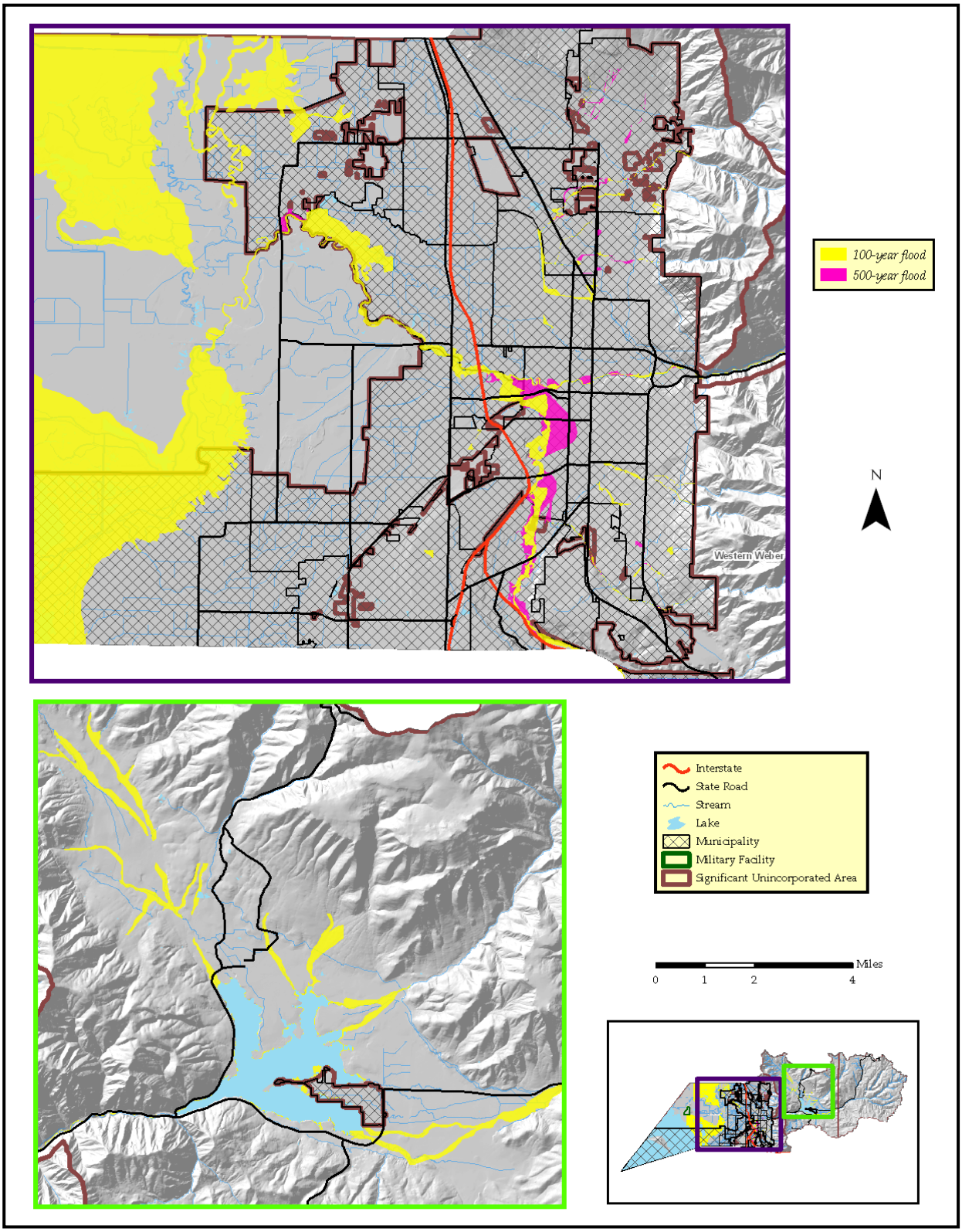
**Table 13-11. Vehicle Losses**

### Debris Removal

Table 13-12 shows how much debris would be generated by flooding and how many loads it would take to remove the debris, based on a capacity of 25 tons per load. One truck can likely haul one load per hour. A second debris removal issue is landfill space. Fifty thousand tons at a weight-to-volume ratio of one ton per cubic yard would cover more than ten acres to a depth of three feet.

| Category | 100-year | 500-year |
|---|---|---|
| Finishes | 3,280 tons/132 loads | 3,982 tons/160 loads |
| Structures | 1,477 tons/60 loads | 1,759 tons/ 71 loads |
| Foundations | 1,813 tons/73 loads | 2,041 tons/82 loads |
| Totals | **6,570 tons/265 loads** | **7,782 tons/313 loads** |

**Table 13-12. Debris Generation and Removal**




**Map 13-6. 100-year and 500 year Floodplains, Weber County** (FIMA 2005)

## 3. Wildland Fire

**Hazard Profile**

| | | | | | |
|---|---|---|---|---|---|
| *Potential Magnitude* | | *Catastrophic (>50%)* | *Probability* | | *Highly Likely* |
| | X | *Critical (25-50%)* | | X | *Likely* |
| | | *Limited (10-25%)* | | | *Possible* |
| | | *Negligible (< 10%)* | | | *Unlikely* |
| *Location* | Wildland-urban interface (WUI) areas the foothills and in forested areas (See Map 13-7 page 301). | | | | |
| *Seasonal Pattern* | Summer months. | | | | |
| *Conditions* | Areas affected by drought, heavily overgrown, or with dry brush and debris. Lightning and human triggers. | | | | |
| *Duration* | Wildfires typically last days but can last months, depending on climate and fuel load as well as resources (financial, manpower) to extinguish the fire. | | | | |
| *Secondary Hazards* | Landslides, debris flows, erosion, traffic accidents, air pollution. | | | | |
| *Analysis Used* | Review of plans and data provided by US Forest Service, National Climate Center, FEMA, AGRC, County Hazard Analysis Plans, and DHLS. | | | | |

### Description of Location and Extent

Potential wildfire hazard within Weber County is growing as population growth is spreading into wildland areas known as the Wildland-Urban Interface (WUI). Over the past 30 years urban sprawl has encroached upon forested foothill areas and wildland areas. A wildfire in these areas would threaten life and property. According to the County Emergency Operations Plan, the upper valley of Weber County will average one lightning caused fire approximately every 80-100 years. However, humans have increased wildfire threat to one every 8-10 years. Fire personnel respond to an average of 50 fires in the wildland areas every year; 20% of which are caused by lightning and 80% by humans. Most fires can be contained in a quarter-acre to one-acre area if they have not traveled into the wildland zones higher on the mountain, which are more difficult to fight due to steep mountain terrain.

Large numbers of homes/structures make the wildfire threat within the county most severe in the Uintah Highlands area, east of Weber State University, the mouth of Ogden Canyon, Coldwater Canyon, upper east area of Harrison Blvd., North Ogden, Pleasant View, Wolf Creek, Powder Mountain, Maple Canyon, South Fork, and Snow Basin.

### Vulnerability Assessment

Table 13-13 (next page) estimates infrastructure vulnerable to wildland fire in Weber County. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software. Table 13-14 estimates the total area, population and buildings vulnerable to wildland fire for individual cities and unincorporated areas.

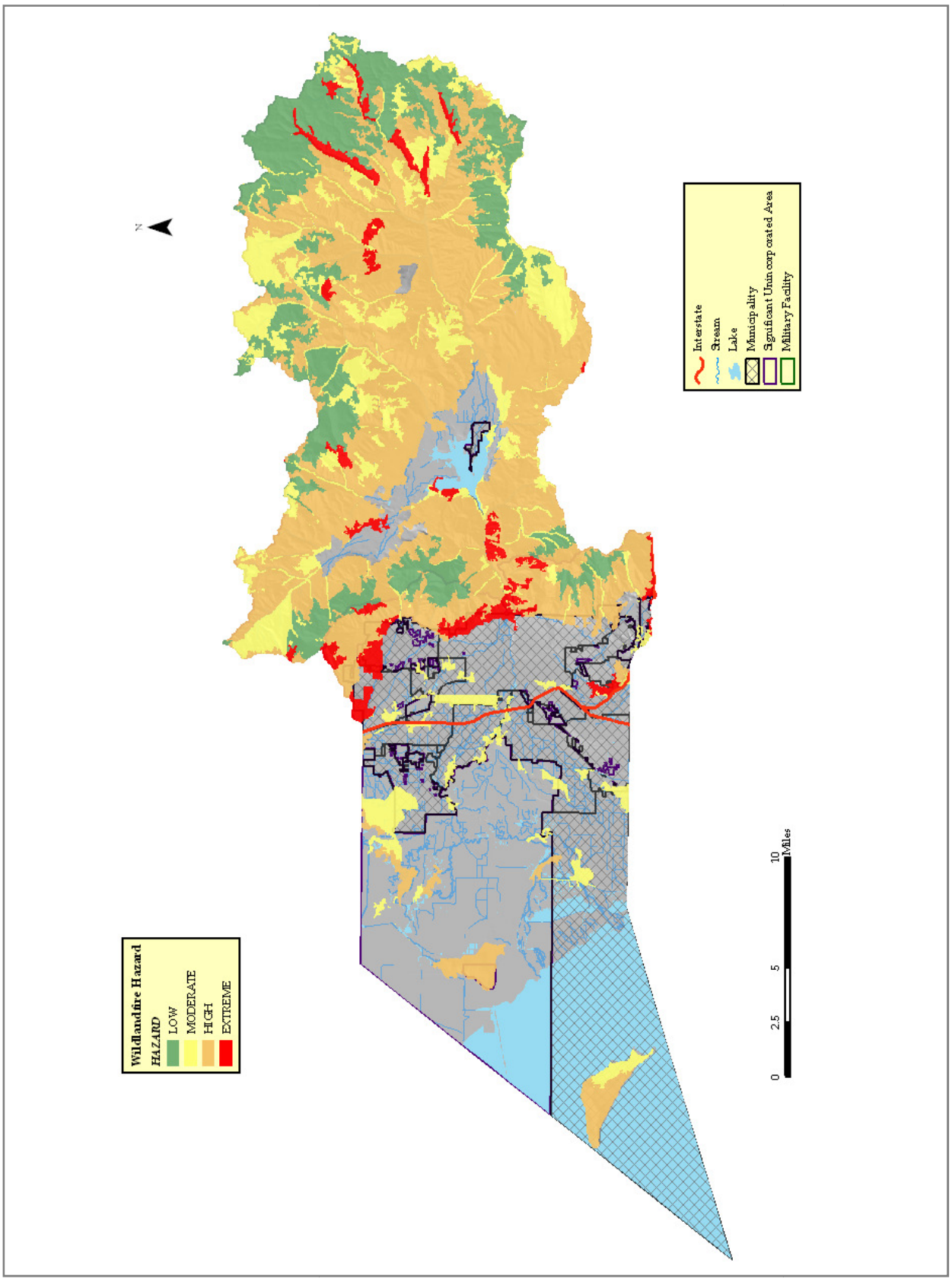
| Item | Length (Miles) or Number of Units | Replacement Cost |
|---|---|---|
| Highways/Interstates | 153.80 miles | $787,196,250 |
| Highway Bridges | 141 bridges | $1,845,264,307 |
| Railway Segments | 106.27 miles | $122,081,686 |
| Railway Bridges | 5 bridges | $884,940 |
| Water Distribution Lines | N/A | N/A |
| Gas Lines | N/A | N/A |
| Sewer Lines | N/A | N/A |
| **Total Estimated Infrastructure Replacement Cost** | | **$2,755,427,183** |

**Table 13-13. Infrastructure Vulnerable to Wildland Fire, Weber County**

| Incorporated Areas | Acres Affected | Population Affected | Structures in Areas of Moderate or Greater Hazard | |
|---|---|---|---|---|
| | | | Residential (Replacement Value) | Commercial (Annual Sales) |
| Farr West | 129 | 18 | 24<br>$3,547,600 | 5<br>$24,691,975 |
| Harrisville | 368 | 187 | 169<br>$48,012,600 | 14<br>$15,189,309 |
| Hooper | 174 | 129 | 47<br>$14,873,800 | 0<br>0$ |
| Huntsville | 0 | 0 | 0 | 0 |
| Marriot-Slaterville | 0 | 0 | 0 | 0 |
| North Ogden | 1,326 | 818 | 435<br>$95,782,600 | 9<br>$3,262,461 |
| Ogden | 1,618 | 1,150 | 684<br>$150,033,600 | 29<br>$13,113,043 |
| Plain City | 45 | 0 | 0 | 0 |
| Pleasant View | 1,445 | 170 | 188<br>$47,938,800 | 3<br>$1,252,280 |
| Riverdale | 462 | 43 | 14<br>$3,524,800 | 5<br>$3,511,241 |
| Roy | 0 | 0 | 0 | 0 |
| South Ogden | 22 | 0 | 0 | 0 |
| Uintah | 80 | 56 | 168<br>$58,693,200 | 0<br>$0 |
| Washington Terrace | 316 | 160 | 50<br>$15,416,000 | 3<br>$1,425,273 |
| West Haven | 25 | 0 | 0 | 0 |

| Unincorporated Areas | Acres Affected | Population Affected | Structures in Areas of Moderate or Greater Hazard | |
|---|---|---|---|---|
| | | | Residential (Replacement Value) | Commercial (Annual Sales) |
| Little Mountain Test Annex | 781 | 0 | 0 | 0 |
| Ogden Valley | 207,682 | 610 | 1,250<br>$436,026,600 | 34<br>$21,451,812 |
| Western Weber | 9,869 | 509 | 159<br>$47,136,600 | 5<br>$2,849,781 |

**Table 13-14. Vulnerability Assessment for Wildland Fire, Weber County**




**Map 13-7. Wildland Fire Hazard, Weber County** (UDFFSL 2007)

**4. Slope Failure**

## Hazard Profile

| | | | | | |
|---|---|---|---|---|---|
| ***Potential Magnitude*** | | ***Catastrophic (>50%)*** | ***Probability*** | | ***Highly Likely*** |
| | | ***Critical (25-50%)*** | | ***X*** | ***Likely*** |
| | ***X*** | ***Limited (10-25%)*** | | | ***Possible*** |
| | | ***Negligible (< 10%)*** | | | ***Unlikely*** |
| ***Location*** | Generally occur in canyon mouths and foothill areas (See Map 13-8 page 305). | | | | |
| ***Seasonal Pattern*** | Spring and summer; after heavy or long-duration precipitation. | | | | |
| ***Conditions*** | Usually caused by the stress release of over-weighted soils, shallow groundwater in certain soils or loosening of rock and debris. | | | | |
| ***Duration*** | Generally last hours or days, but some can last for longer periods. | | | | |
| ***Secondary Hazards*** | Flooding (natural dams), traffic accidents. | | | | |
| ***Analysis Used*** | Information and maps provided by UGS, DHLS, AGRC. | | | | |

## Description of Location and Extent

Future landslide areas are usually located near the areas of historical landslides, which are well-defined localized areas. Historically, landslides have been one of the most frequent hazards within Weber County. Homes high along the benches and in the canyons are at the greatest risk of rockfalls, debris flows, landslides and other types of slope failure. Refer to Map 13-8, page 305.

Historic landslides have been identified in Ogden Canyon and Washington Terrace. The Ogden Canyon slide is south of the canyon mouth and forms a 200 foot high bluff above the south bank of the Ogden River, over 90 acres in size. Washington Terrace has a series of landslides four miles long, starting two miles west of the mouth of Weber Canyon and ending on the northwest side of Washington Terrace. Landslides have also occurred in Ogden Canyon between the mouth and Pineview Dam and over North Ogden Pass as well.

East of Plain City and Harrisville there is evidence of lateral spread of more than 2,000 feet. The north-central portion of the county shows evidence of slumps, earth flows and other deep-seated landslides. Extending north to south in the central portion of the county are smaller (less than 2000 ft) lateral spread landslides. The eastern portion of the county exhibits rockfall, colluvial, talus, glacial and soil-creep landslides larger than 2000 ft.

There are three prominent rockslide areas in the county and many smaller areas. The North Ogden rockslide is 100 acres in size and is one mile northwest of the mouth of North Ogden Canyon. The College rockslide is about 80 acres in size and is located east of the Weber State University campus. The Beus Canyon slide is one half mile square and is located immediately south of the College slide. Ogden Canyon, north of the mouth, is home to smaller rockslides. Potential rockslide hazards exist north of Taylor Canyon.

Debris flows and mudslides are possible near the mouth of Weber Canyon west to Riverdale, which could impact railroads, utilities, storm drainage lines, and residential property. Past landslides have damaged several homes in this area. Erosion is a threat from Weber Canyon westward including the towns of Uintah and Riverdale. Homes, utilities, and bridges are at risk.

## Vulnerability Assessment

Table 13-15 (below) estimates infrastructure vulnerable to landslides in Weber County. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software. Table 13-16 estimates the total area, population, and buildings vulnerable to landslides.

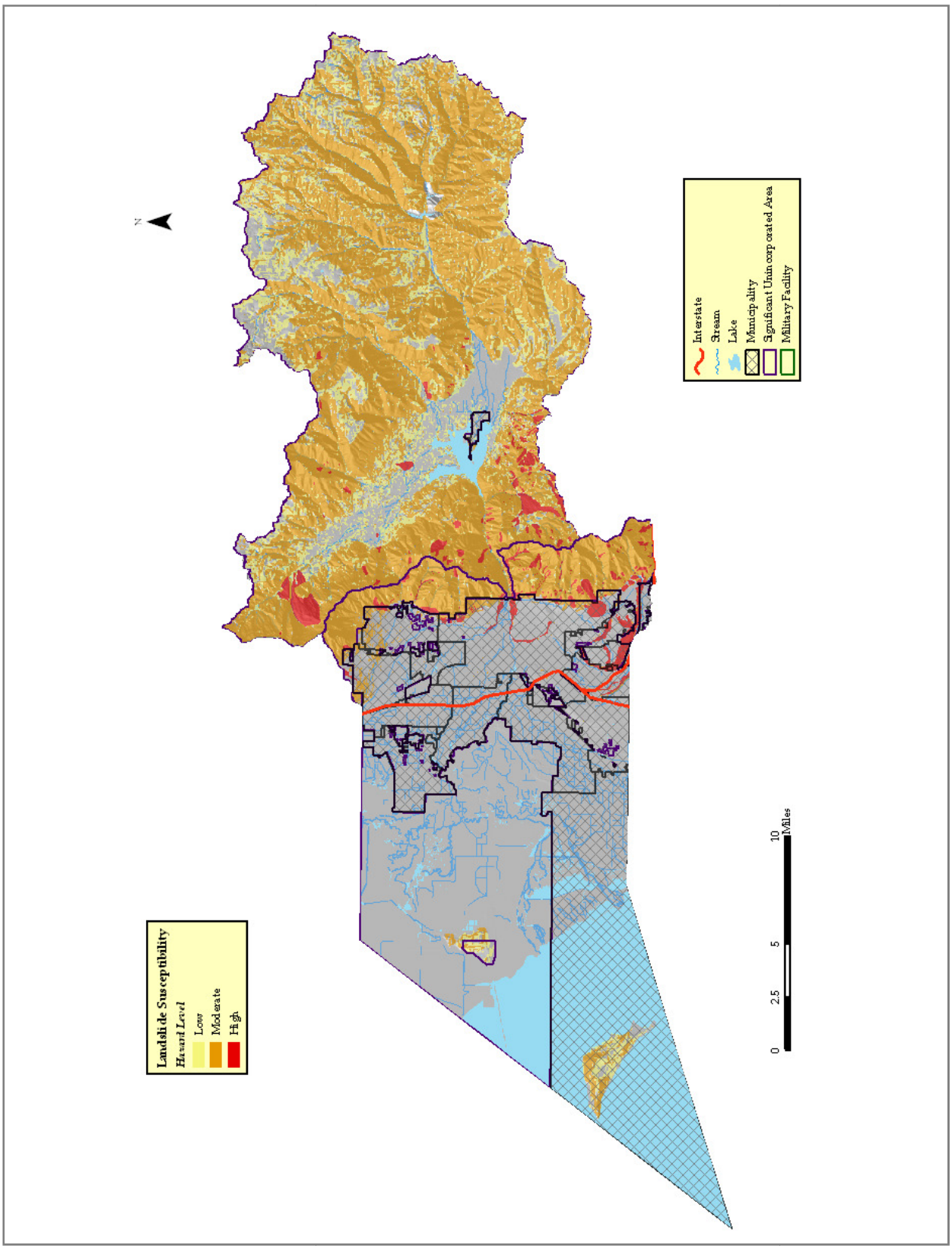
| Item | Length (Miles) or Number of Units | Replacement Cost |
|---|---|---|
| Highways/Interstates | 36.85 miles | $173,291,730 |
| Highway Bridges | 13 bridges | $6,752,222 |
| Railway Segments | 9.44 miles | $10,846,560 |
| Railway Bridges | 0 bridges | $0 |
| Water Distribution Lines | 503.25 miles | $16,196,665 |
| Gas Lines | 201.32 miles | $6,478,679 |
| Sewer Lines | 301.92 miles | $9,718,041 |
| **Total Estimated Infrastructure Replacement Cost** | | **$223,283,897** |

**Table 13-15. Infrastructure Vulnerable to Landslide, Weber County**

| Incorporated Areas | Acres Affected | Population Affected | Structures in Areas of Moderate or Greater Hazard | |
|---|---|---|---|---|
| | | | Residential (Replacement Value) | Commercial (Annual Sales) |
| Farr West | 0 | 0 | 0 | 0 |
| Harrisville | 0 | 0 | 0 | 0 |
| Hooper | 0 | 0 | 0 | 0 |
| Huntsville | 14 | 20 | 5<br>$727,000 | 0<br>0$ |
| Marriot-Slaterville | 0 | 0 | 0 | 0 |
| North Ogden | 857 | 6,147 | 1,744<br>$253,577,600 | 7<br>$1,400,682 |
| Ogden | 2,458 | 13,630 | 4,856<br>$706,062,400 | 3,568<br>$1,855,498,277 |
| Plain City | 0 | 0 | 0 | 0 |
| Pleasant View | 683 | 2,043 | 500<br>$72,700,000 | 4<br>$1,418,263 |
| Riverdale | 466 | 2,119 | 826<br>$120,100,400 | 33<br>$25,727,502 |
| Roy | 16 | 131 | 51<br>$7,415,400 | 1<br>$12,489 |
| South Ogden | 535 | 4,347 | 1,702<br>$247,470,800 | 31<br>$10,945,604 |
| Uintah | 110 | 2,085 | 830<br>$120,682,000 | 4<br>$822,853 |
| Washington Terrace | 481 | 3,606 | 1,444<br>$209,957,600 | 18<br>$2,666,940 |
| West Haven | 0 | 0 | 0 | 0 |

| Unincorporated Areas | Acres Affected | Population Affected | Structures in Areas of Moderate or Greater Hazard | |
|---|---|---|---|---|
| | | | Residential (Replacement Value) | Commercial (Annual Sales) |
| Little Mountain Test Annex | 143 | 0 | 0<br>$0 | 0<br>$0 |
| Ogden Valley - East | 68,579 | 408 | 116<br>$16,866,400 | 5<br>$905,219 |
| Ogden Valley - West | 70,003 | 5,995 | 1,842<br>$267,826,800 | 22<br>$4,209,746 |
| Western Weber - North | 0 | 0 | 0 | 0 |
| Western Weber - South | 0 | 0 | 0 | 0 |
| Western Weber - West | 0 | 0 | 0 | 0 |

**Table 13-16. Vulnerability Assessment for Landslides, Weber County**




**Map 13-8. Landslide Susceptibility, Weber County** (Giraud and Shaw 2007)

## 5. Dam Failure

### Hazard Profile

| | | | | | |
|---|---|---|---|---|---|
| ***Potential Magnitude*** | X | ***Catastrophic (>50%)*** | ***Probability*** | | ***Highly Likely*** |
| | | ***Critical (25-50%)*** | | | ***Likely*** |
| | | ***Limited (10-25%)*** | | X | ***Possible*** |
| | | ***Negligible (< 10%)*** | | | ***Unlikely*** |
| ***Location*** | See Map 13-9 (page 309) | | | | |
| ***Frequency*** | *Rainy Day Failure:* Spring, Late Summer<br>*Sunny Day Failure:* Anytime | | | | |
| ***Conditions*** | *Rainy-day failure* happens mainly during heavy precipitation events, can have some warning time. *Sunny day failure* happens with no warning at all and can happen at anytime. | | | | |
| ***Duration*** | Hours - Days | | | | |
| ***Secondary Hazards*** | Raw sewage/health risk, electrical fires, gas spills. | | | | |
| ***Analysis Used*** | Review of Bureau of Reclamation inundation maps and plans, Flood Insurance Studies, Utah Division of Water Rights. | | | | |

### Description of Location and Extent

Seven dams are designated as high hazard within Weber County, meaning if they fail they have a high probability of causing loss of life and extensive economic loss. Twenty-one dams are listed as being moderate (low probability of causing loss of life; appreciable property damage) (Table 13-17).

The dam safety hazard is classified by the State Engineer. This classification is based upon the damage caused if the dam were to fail, not the dam's probability of failure. Therefore, the classification of a high hazard dam does not mean that the dam has a high probability of failure.

Other dams outside the County boundaries that could also affect Weber County include: Echo Dam, located between Morgan and Park City; Wanship Dam/Rockport Reservoir, located upstream from Echo Dam; East Canyon Dam, south of Morgan City; and Lost Creek Dam northeast of Morgan City; as well as AV Watkins Dam - Willard Reservoir/ Willard Bay, located in Box Elder County on the northern border of Weber County. Willard Bay is a diked bay of the Great Salt Lake that has a capacity greater than 215,000 acre-feet of water. A catastrophic breach of the reservoir could flood much of the northwestern portion of Weber County.

| NAME | RATING |
|---|---|
| BOR WASTEWAY RESERVOIR NO. 2 | Moderate |
| BOR WASTEWAY RESERVOIR NO. 3 | Moderate |
| FOURMILE DEBRIS BASIN-HARRISVILLE DAM | Moderate |
| GRAND LEGACY IRRIGATION RESERVOIR | Moderate |
| HOOPER IRRIGATION COMPANY | Moderate |
| KELLY CANYON | Moderate |
| NORTH OGDEN CITY COLDWATER CANYON | Moderate |
| NORTH OGDEN CITY OAK LAWN PARK | Moderate |
| OGDEN CITY BEUS POND | Moderate |
| PINEVIEW DETENTION BASIN | Moderate |
| PLEASANT VIEW RESERVOIR (WEBER/BE #6) | Moderate |
| SOURDOUGH WILDERNESS RANCH | Moderate |
| UTABA RETARDING | Moderate |
| WEBER/BOXELDER RESERVOIR #4 | Moderate |
| WEBER/BOXELDER RESERVOIR #5 | Moderate |
| WEBER/BOXELDER RESERVOIR #7 | Moderate |
| WEBER/BOXELDER RESERVOIR #8 | Moderate |
| WEBER-BOX ELDER CONSERVATION DISTRICT | Moderate |
| WOLF CREEK IRRIGATION CO. 99-35-72MD | Moderate |
| WOLF CREEK IRRIGATION COMPANY | Moderate |
| WOLF CREEK WATER CONSERVANCY DISTRICT | Moderate |
| BOR CAUSEY | High |
| BOR COMBE EQUALIZING RESERVOIR | High |
| BOR PINEVIEW | High |
| NORTH OGDEN CITY ORTON PARK/2100 NORTH | High |
| OGDEN CITY - SULLIVAN HOLLOW | High |
| SOUTH OGDEN CITY BURCH CREEK (GLASMANN) | High |
| SOUTH OGDEN CITY BURCH CREEK DEBRIS | High |

**Table 13-17. Inventory of High and Moderate Hazard Dams** (Utah Division of Water Rights 2007)

## Vulnerability Assessment

Table 13-18 (next page) estimates the total area, population and buildings vulnerable to dam failure for individual cities and Table 13-19 examines the same for unincorporated areas. Table 13-20 estimates infrastructure vulnerable to dam failure in Weber County. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software. Editors Note: These estimates include a catastrophic failure of the Bureau of Reclamation Dams. Specific dam failure data was not available when this plan was developed and will be added in subsequent plan updates.

| Incorporated Areas | Acres Affected | Population Affected | Structures in Inundation Areas | |
|---|---|---|---|---|
| | | | Residential (Replacement Value) | Commercial (Annual Sales) |
| Farr West | 2,000 | 4,800 | 0 | 0 |
| Harrisville | 640 | 1,500 | 0 | 0 |
| Hooper | 4,800 | 2,000 | 0 | 0 |
| Huntsville | 320 | 250 | 0 | 0 |
| Marriot-Slaterville | 4,000 | 0 | 0 | 0 |
| North Ogden | 109 | 583 | 184<br>$26,753,600 | 17<br>$20,253,156 |
| Ogden | 1,285 | 10,000 | 654<br>$95,091,600 | 229<br>$136,063,049 |
| Plain City | 4,000 | 8,000 | 0 | 0 |
| Pleasant View | 0 | 0 | 0 | 0 |
| Riverdale | 1,800 | 4,500 | 20<br>$2,908,000 | 2<br>$1,111,176 |
| Roy | 0 | 0 | 0 | 0 |
| South Ogden | 38 | 251 | 96<br>$13,958,400 | 1<br>$530,390 |
| Uintah | 640 | 800 | 0 | 0 |
| Washington Terrace | 0 | 0 | 0 | 0 |
| West Haven | 1,800 | 1,500 | 0 | 0 |

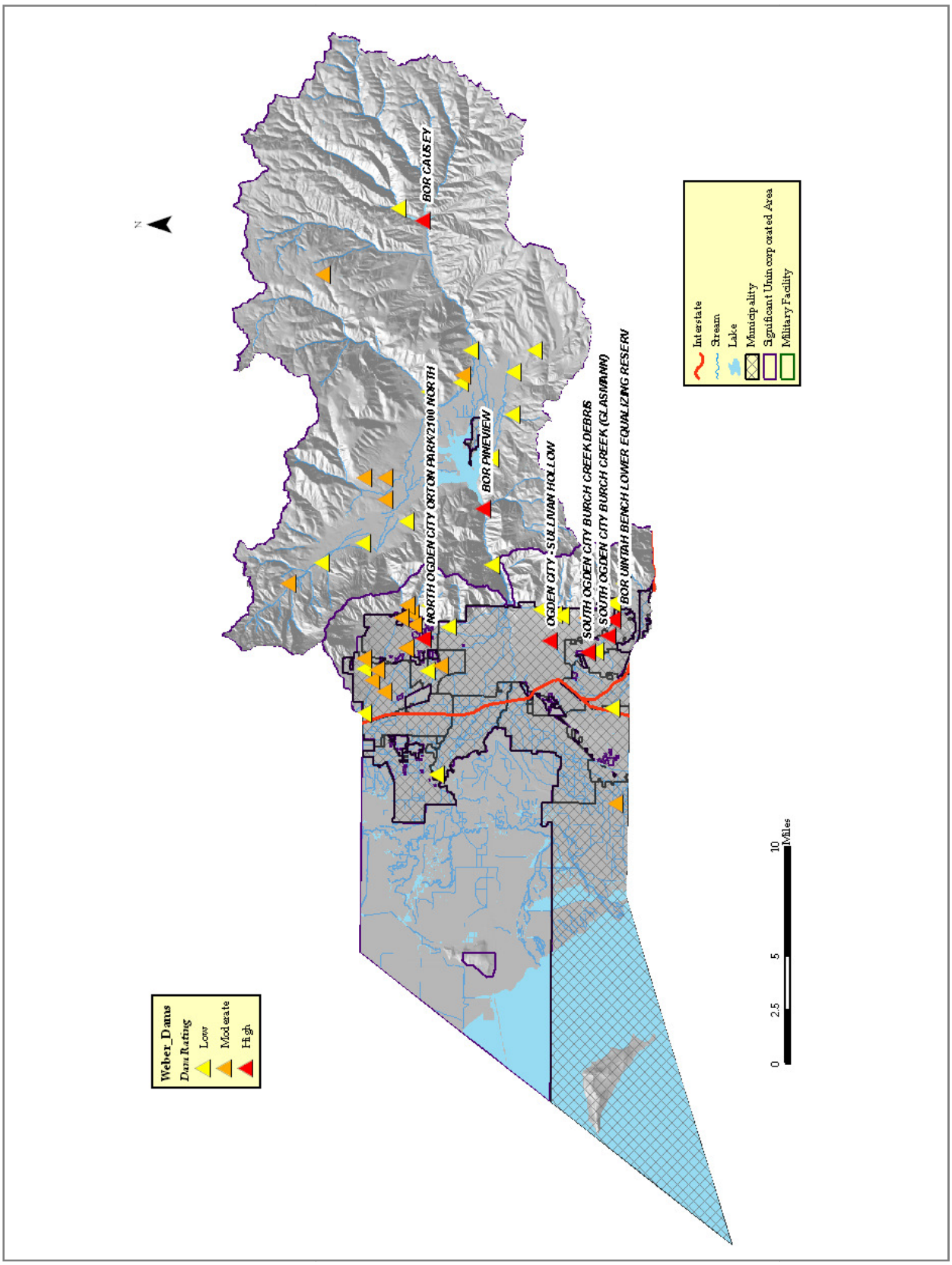
**Table 13-18. Vulnerability Assessment for Dam Failure, Incorporated Weber County**

| Unincorporated Areas | Acres Affected | Population Affected | Structures in Inundation Areas | |
|---|---|---|---|---|
| | | | Residential (Replacement Value) | Commercial (Annual Sales) |
| Little Mountain Test Annex | 0 | 0 | 0 | 0 |
| Ogden Valley | 5,400 | 950 | 0 | 0 |
| Western Weber - South | 1,200 | 104 | 37<br>$5,379,800 | 0 |
| Western Weber - West | 36,000 | 3,500 | 0 | 0 |

**Table 13-19. Vulnerability Assessment for Dam Failure, Unincorporated Weber County**

| Item | Length (Miles) or Number of Units | Replacement Cost |
|---|---|---|
| Highways/Interstates | 1.71 miles | $7,367,592 |
| Highway Bridges | 0 bridges | $0 |
| Railway Segments | 1.93 miles | $2,219,238 |
| Railway Facilities | 0 bridges | $0 |
| Water Distribution Lines | N/A | N/A |
| Gas Lines | N/A | N/A |
| Sewer Lines | N/A | N/A |
| **Total Estimated Infrastructure Replacement Cost** | | **$9,586,830** |

**Table 13-20. Infrastructure Vulnerable to Dam Failure, Weber County**




**Map 13-9. Dams and Associated Risk Levels, Weber County** (Utah Division of Water Rights 2007)

## 6. Problem Soils

### Hazard Profile

| Potential Magnitude | | | Probability | | |
|---|---|---|---|---|---|
| | | *Catastrophic (>50%)* | | | *Highly Likely* |
| | | *Critical (25-50%)* | | | *Likely* |
| | X | *Limited (10-25%)* | | X | *Possible* |
| | | *Negligible (< 10%)* | | | *Unlikely* |

| | |
|---|---|
| ***Location*** | See Map 13-10 (page 312) |
| ***Frequency*** | Continuous. |
| ***Conditions*** | Conditions vary by geologic formation. |
| ***Duration*** | Minutes to Years. |
| ***Secondary Hazards*** | Flooding (broken water pipes), fire (broken gas pipes). |
| ***Analysis Used*** | Utah Geological Survey. |

### Description of Location and Extent

Two types of problems soils are present in Weber County – limestone and expansive soils. Both of these hazards are primarily found in the Wasatch Mountains in the eastern part of the County. See Map 13-10 (page 312) for more information on the locations of problem soils in Weber County.

Limestone karst structures are easily eroded by water and therefore often form caverns and crevices. If these caverns become large enough, the overlying ground can give way causing sink holes and other forms of subsidence. Structures directly over the karst structure have a high potential for collapse. Ground water contamination is also possible (Mulvey 1992). Developed areas of Ogden Canyon may present some evidence of karst hazard. Expansive soils can absorb significant quantities of water. When a home or road is placed on top of these soils, normal evaporation cannot take place. The clay begins to absorb more water than is evaporated and begins to expand, causing heaving. During especially dry periods, these soils can contract significantly causing subsidence and ground cracking. Residents already living in these areas should avoid excessive watering, make sure sufficient water drainage is in place around the home and ensure plumbing and irrigation pipes and fixtures are well protected from breakage or leaks (Kaliser 1972). Developments around Pineview Reservoir and northern Ogden Valley may experience some drainage problems, subsidence and/or landslides.

### Vulnerability Assessment

Table 13-21 (next page) estimates infrastructure vulnerable to problem soils in Weber County. Provided are the number of units or total length of infrastructure vulnerable and the estimated replacement costs as provided by HAZUS-MH lost estimation software. Table 13-22 estimates the total area, population, and buildings vulnerable to problem soils for individual cities and unincorporated areas.

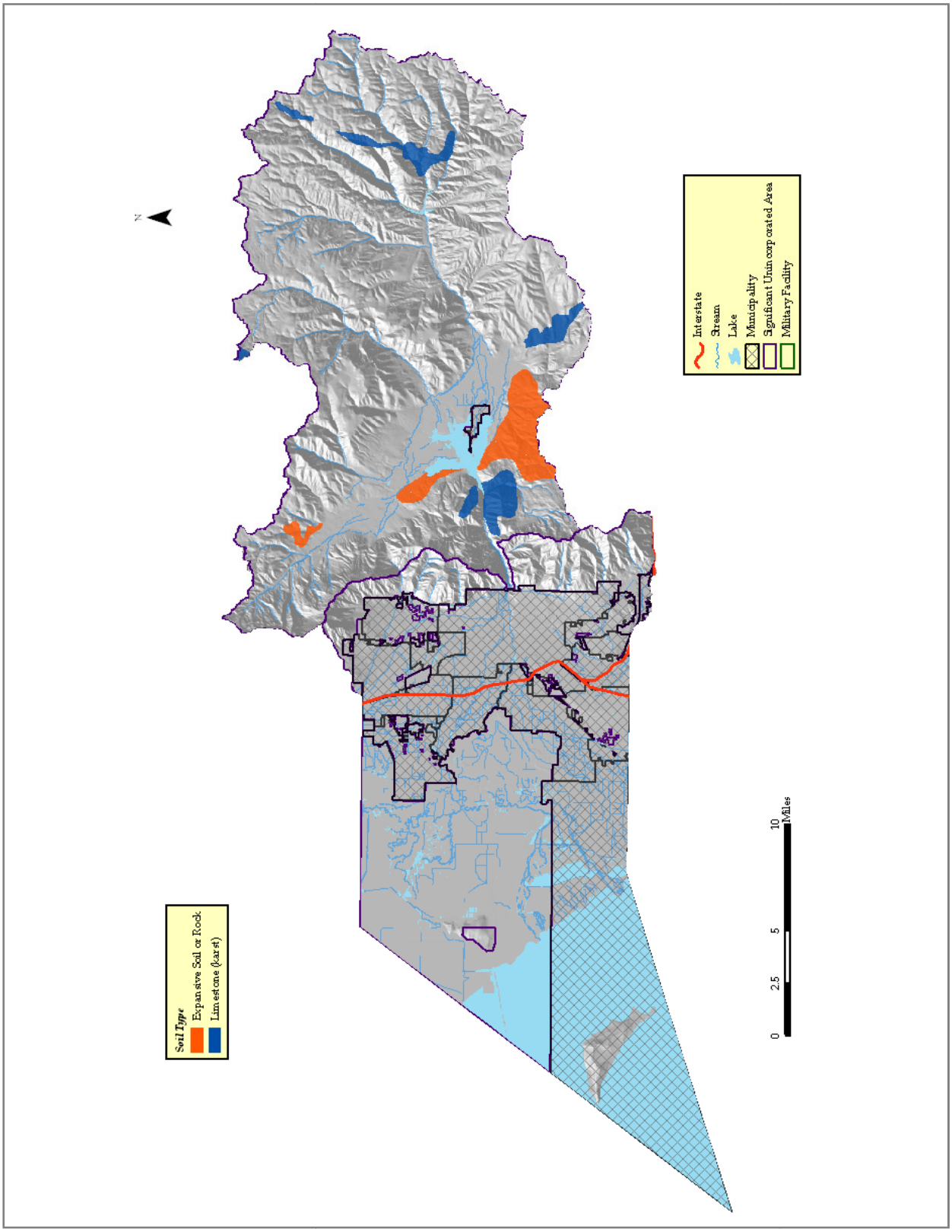
| Item | Length (Miles) or Number of Units | Replacement Cost |
|---|---|---|
| Highways/Interstates | 9.28 miles | $39,945,034 |
| Highway Bridges | 1 bridge | $476,756 |
| Railway Segments | 0 miles | $0 |
| Railway Facilities | 0 bridges | $0 |
| Water Distribution Lines | 35.91 miles | $1,155,825 |
| Gas Lines | 14.36 miles | $462,331 |
| Sewer Lines | 21.55 miles | $693,499 |
| Total Estimated Infrastructure Replacement Cost | | $42,733,445 |

**Table 13-21. Infrastructure Vulnerable to Problem Soils, Weber County**

| Incorporated Areas | Acres Affected | Population Affected | Structures in Areas of Moderate or Greater Hazard | |
|---|---|---|---|---|
| | | | *Residential* (Replacement Value) | *Commercial* (Annual Sales) |
| Farr West | 0 | 0 | 0 | 0 |
| Harrisville | 0 | 0 | 0 | 0 |
| Hooper | 0 | 0 | 0 | 0 |
| Huntsville | 0 | 0 | 0 | 0 |
| Marriot-Slaterville | 0 | 0 | 0 | 0 |
| North Ogden | 0 | 0 | 0 | 0 |
| Ogden | 0 | 0 | 0 | 0 |
| Plain City | 0 | 0 | 0 | 0 |
| Pleasant View | 0 | 0 | 0 | 0 |
| Riverdale | 0 | 0 | 0 | 0 |
| Roy | 0 | 0 | 0 | 0 |
| South Ogden | 0 | 0 | 0 | 0 |
| Uintah | 0 | 0 | 0 | 0 |
| Washington Terrace | 0 | 0 | 0 | 0 |
| West Haven | 0 | 0 | 0 | 0 |

| Unincorporated Areas | Acres Affected | Population Affected | Structures in Areas of Moderate or Greater Hazard | |
|---|---|---|---|---|
| | | | *Residential* (Replacement Value) | *Commercial* (Annual Sales) |
| Little Mountain Test Annex | 0 | 0 | 0 | 0 |
| Ogden Valley | 36,208 | 0 | 0 | 0 |
| Western Weber | 0 | 0 | 0 | 0 |

**Table 13-22. Vulnerability Assessment for Problem Soils, Weber County**




**Map 13-10. Problem Soils Hazard, Weber County** (Mulvey 1992)

## Hazards and Future Development

| Population Estimates | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **County** | **2000 Pop (July 1)** | **2006 Pop (est.)** | **Absolute Change 2000-2006** | **% Change 2000-2006** | **AARC 2000-2006** | **Rank by 2000 Pop** | **Rank by Absolute Change** | **Rank by % Change** | **Rank by AARC** |
| Weber County | 197,541 | 215,870 | 18,329 | 9.3% | 1.3% | 4 | 5 | 14 | 13 |
| **Population by County and Multi-County District** | | | | | | | | | |
| **MCD/ County** | **1980** | **1990** | **2000** | **2010** | **2020** | **2030** | **2040** | **2050** | **AARC 2000-2050** |
| Wasatch Front | 941,172 | 1,104,356 | 1,389,252 | 1,665,238 | 1,966,372 | 2,207,282 | 2,429,057 | 2,654,682 | 1.3% |
| Weber County | 145,000 | 158,673 | 197,541 | 230,145 | 271,339 | 306,227 | 338,579 | 371,429 | 1.3% |
| **Households by County and Multi-County District** | | | | | | | | | |
| **MCD/ County** | **1980** | **1990** | **2000** | **2010** | **2020** | **2030** | **2040** | **2050** | **AARC 2000-2050** |
| Wasatch Front | 298,700 | 357,257 | 446,844 | 565,333 | 679,589 | 780,369 | 870,671 | 960,756 | 1.5% |
| Weber County | 50,501 | 57,851 | 66,082 | 80,279 | 99,428 | 119,489 | 140,478 | 163,561 | 16.4% |

**Table 13-23. Demographic and Economic Projections** (UPEC 2007, 2008). All statistics are based on July 1. AARC = Average Annual Rate of Change

Some Weber County development has recently slowed, with many new developments stalled. Development that is still occurring is found in the foothills and on agricultural lands. The Wasatch Mountain Range and the Great Salt Lake restrain development in the eastern and western reaches of Weber County.

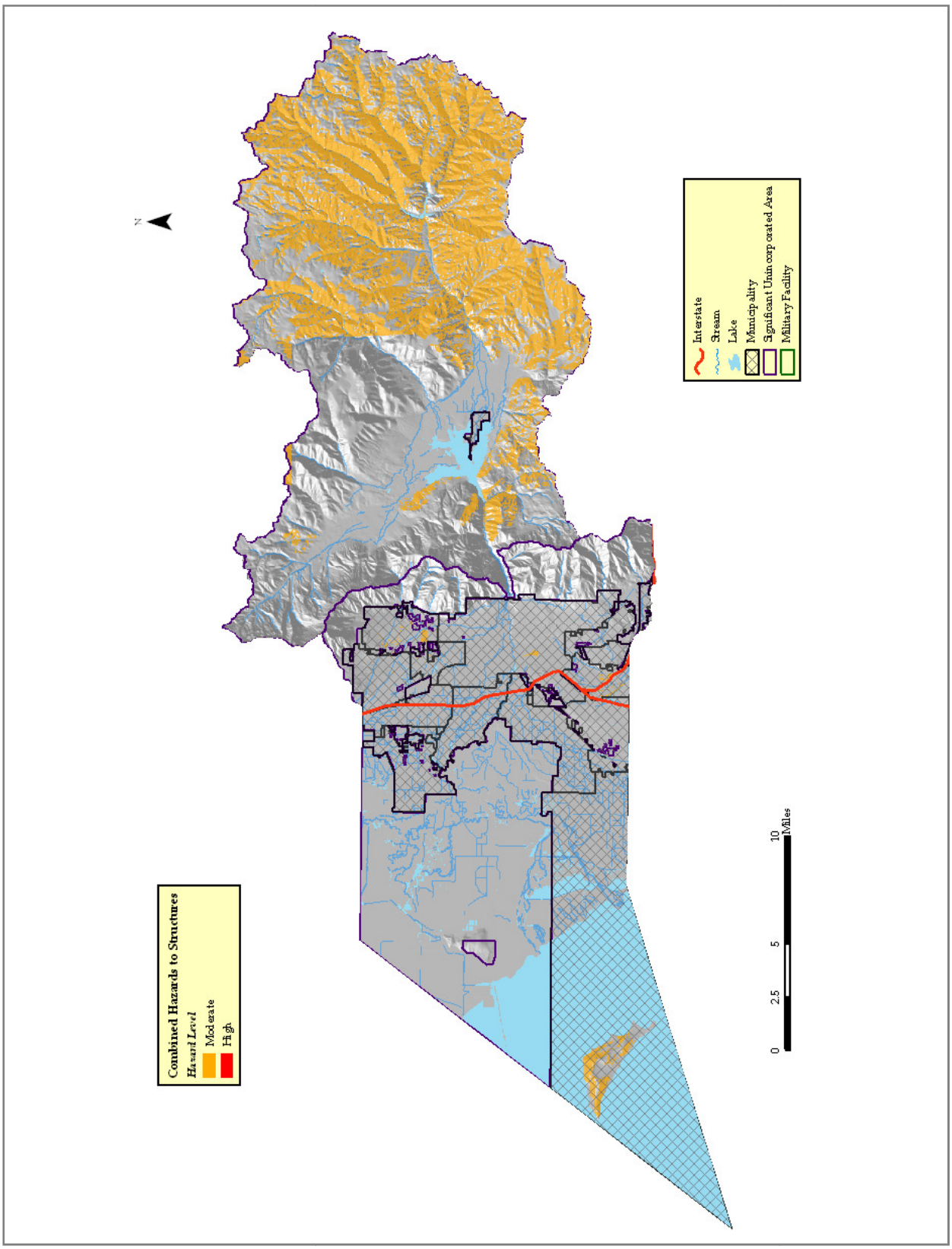
Those portions of the County that are near the Great Salt Lake are subject to high liquefaction in the event of an earthquake and therefore pose a risk to residents and structures. The County and municipalities can mitigate the earthquake threat and its secondary risks through the continued use of zoning ordinances and building codes. Examples of appropriate forms of land use along fault lines include "farms, golf courses, parks, and undeveloped open space" (UGS 1996).

Flooding is also of considerable concern along the Weber River. Zoning restrictions on building location and building codes preventing basements would be well-suited in these areas.

Wildfire risk is most severe in the foothills of the Wasatch Mountain Range. These areas, known as Wildland-Urban Interface (WUI) zones, are most vulnerable due to the amount and types of vegetation and new structures that act as fuel to a burning fire. This threat may be mitigated by encouraging communities to become "Fire Wise Communities", continued use of building and zoning codes and increasing the public's awareness.

Landslide/slope failure is another threat near the foothills of the Wasatch Mountains. Much new development can be found near areas of current landslides. More detailed landslide studies and zoning appropriate for high hazard areas will decrease the likelihood of landslides damaging persons and property.

Map 13-11 (page 315) shows the combined risk of nine structurally-threatening hazards (dam failure, earthquake, flood, landslide, lightning, problem soils, tornado, wildland fire and wind) in Weber County. The areas of high hazard (red) are areas of high landslide and flood risk as well as the "extreme" risk wildland fire areas. These areas are best preserved as open space to protect citizens from almost certain disasters. The moderate areas of the map (orange) are those areas having moderate or greater risk from five (5) or more structurally-threatening hazards. These areas should be preserved as open space if not already developed or hazard-appropriate development encouraged. If already developed, these areas should be the initial focus of education campaigns and for regulatory requirements of hazard mitigation techniques by residents.




**Map 13-11. Combined Structural Hazards, Weber County**

## Mitigation Strategies

The following mitigation strategies were formulated by the Weber County Mitigation Strategies Working Group on September 18th, 2007, at the Weber County Sheriff's Office. The Working Group sought to refine and expand on efforts already in place from the 2003 edition of this Plan. Information on Working Group members can be found in Part III.

**Dam Failure**

**<u>Problem Identification:</u> The failure of federal, state and private dams can impact Weber County. Debris basins of concern include Birch Creek, Glassman Way and Harrison Blvd.**

**OBJECTIVE #1 (Priority MEDIUM):** Reduce the impact of catastrophic flooding due to dam failure

***Action 1:*** Re-evaluate current high hazard dams and evaluate use of early warning sirens to warn public.

*Time Frame:* Ongoing
*Funding:* Local and State
*Estimated Cost:* Unknown
*Staff:* County Emergency Management
*Jurisdictions:* Countywide

***Action 2:*** Identify and fund dams needing armored concrete chutes.

*Time Frame:* Unknown; based on funding
*Funding:* Local and State
*Estimated Cost:* Unknown
*Staff:* Storm water Management, County Engineer, State Engineer
*Jurisdictions:* Countywide

***Action 3:*** In partnership with the U. S. Bureau of Reclamation (BOR), develop accurate dam failure inundation maps for BOR dams.

*Time Frame:* Unknown, based on funding
*Funding:* Local, state and federal
*Estimated Cost:* Unknown
*Staff:* County Emergency Management, State, BOR
*Jurisdictions:* Countywide

## Earthquake

**<u>Problem Identification:</u> Non-structural hazards in the Weber County schools are a threat to students, employees, and facilities while also causing increases in recovery time/activities following an earthquake.**

**Objective #1 (Priority HIGH):** Reduce the impact of non-structural events following an earthquake

***Action 1:*** Develop and implement a manual similar to Salt Lake City (SLC) school districts

*Time Frame:* Immediate
*Funding:* School Districts, State Earthquake Program Grant
*Estimated Cost:* Minimal if using SLC School District template
*Staff:* School Districts, County Emergency Management
*Jurisdictions:* Countywide

***Action 2:*** Develop a training document for schoolteachers showing non-structural mitigation activities for classrooms

*Time Frame:* Ongoing
*Funding:* County Emergency Services, State Earthquake Program
*Estimated Cost:* Minimal
*Staff:* County Emergency Services, School District
*Jurisdictions:* Countywide

**<u>Problem Identification:</u> Critical facilities (public safety, utilities, water/wastewater, schools, hospitals), need to be made less vulnerable from the impacts of earthquakes to allow for a more timely and efficient response and recovery.**

**Objective #2 (Priority HIGH):** Reduce the vulnerability of critical facilities

***Action 1:*** Develop an earthquake vulnerability study for identified critical facilities, including schools, public safety facilities, hospitals and utilities.

*Time Frame:* 5-10 years
*Funding:* Pre-Disaster Mitigation Grant
*Estimated Cost:* Unknown
*Staff:* Local Emergency Planning Committee (LEPC)
*Jurisdictions:* Countywide

***Action 2:*** Study hazardous materials Tier 2 sites for possible seismic retrofit

*Time Frame:* 2 years
*Funding:* Federal grants
*Estimated Cost:* Unknown
*Staff:* LEPC
*Jurisdictions:* Countywide

*Action 3:* Complete vulnerability analysis and develop mitigation plan for Weber Basin Water Conservancy District (WBWCD) facilities.

*Time Frame:* 2 years
*Funding:* PDM grant and WBWCD funds
*Estimated Cost:* $300,000
*Staff:* WBWCD staff
*Jurisdiction:* WBWCD and U. S. Bureau of Reclamation

**Problem Identification: Areas of high liquefaction (western Weber county: Hooper, Far West, West Warren, West Haven, Marriott-Slaterville, Plain City) are experiencing increased growth.**

**Objective #3 (Priority HIGH):** Increased awareness of high liquefaction areas

*Action:* Include current liquefaction maps on the County website

*Time Frame:* Within 1 year
*Funding:* County Emergency Services, County Engineer
*Estimated Cost:* Minimal
*Staff:* County Emergency Services, County Engineer, GIS and Web
*Jurisdictions:* Jurisdictions with potential for liquefaction

**Problem Identification: Development on identified fault traces increases the risk to life and property.**

**Objective #4 (Priority HIGH):** Promote natural hazards ordinance limiting development in high-risk areas

*Action:* Make available copies of county natural hazards ordinance for cities within the county and educate citizens on its implementation

*Time Frame:* Within 1 year
*Funding:* County Emergency Services, County Engineer
*Estimated Cost:* Minimal
*Staff:* County Emergency Services and County Engineer
*Jurisdictions:* Countywide

## Flood

**Problem Identification: Some communities not participating in the National Flood Insurance Program (NFIP).**

**Objective #1 (Priority MEDIUM):** Make federal flood insurance available within communities and adopt flood loss prevention ordinances.

*Action:* Encourage the communities of Hooper, Farr West, Marriott-Slaterville, Washington Terrace and Huntsville to participate in the NFIP.

*Time Frame:* Ongoing
*Funding:* None required
*Estimated Cost:* Minimal
*Staff:* State Floodplain Manager, City Officials, Building Officials
*Jurisdictions:* Washington Terrace, Huntsville

**Problem Identification: Stormwater continues to be a critical flood issue in the county. Stormwater drains are illegally connected to the sewer system in many areas.**

**Objective #2 (Priority HIGH):** Implement and fund identified stormwater projects to lessen impact of flooding in the county.

***Action 1:*** Include current stormwater plans and projects in hazard mitigation plan

*Time Frame:* Ongoing
*Funding:* Funding from County, State, Federal Programs
*Estimated Cost:* Dependant on project
*Staff:* County Stormwater, County Engineer, Stormwater Coalition
*Jurisdictions:* Countywide

***Action 2:*** Reduce stormwater infiltration into sewer system

*Time Frame:* 2-3 years
*Funding:* City/County funds, Stormwater
*Estimated Cost:* Minimal
*Staff:* Central Weser Sewer
*Jurisdictions:* Countywide

***Action 3:*** Update Regional Stormwater Management Plan

*Time Frame:* Spring 2008
*Funding:* Weber County Stormwater monies
*Estimated Cost:* Unknown
*Staff:* County Engineer, City Stormwater Managers
*Jurisdictions:* Countywide

**Problem Identification: Weber County has an extensive canal system. A canal breach or overtopping has occurred and possible future occurrences continue to be a significant flood threat.**

**Objective #3 (Priority HIGH):** Evaluate canals in the county that may cause flooding

***Action 1:*** Identify canals in the county that have the potential to cause damage due to flooding

*Time Frame:* Two years
*Funding:* County Emergency Management, State Mitigation Program Grant
*Estimated Cost:* Dependant on scope of study
*Staff:* County Stormwater, County Engineer
*Jurisdictions:* Countywide, Special Service Districts

***Action 2:*** Identify areas of stormwater entering canals

*Time Frame:* Ongoing
*Funding:* County Emergency Management, water districts
*Estimated Cost:* Unknown
*Staff:* County Stormwater, County Engineer, County Emergency Management
*Jurisdictions:* Countywide

***Action 3:*** Create sub-committee under Stormwater Coalition to handle canal flooding issues

*Time Frame:* November 2009
*Funding:* Stormwater Coalition
*Estimated Cost:* Minimal
*Staff:* Stormwater Coalition
*Jurisdictions:* Countywide

**Problem Identification: Several infrastructure additions and upgrades are needed to mitigate the flood threat.**

**Objective #4 (Priority HIGH):** Add/upgrade mitigation infrastructure

***Action 1:*** Levee needed on Lower Weber River

*Time Frame:* 3-5 years
*Funding:* Federal and State grants; Local match
*Estimated Cost:* Unknown
*Staff:* County Engineer
*Jurisdictions:* Countywide

***Action 2:*** Bridge widening needed on Ogden River at Washington and Lincoln Boulevards

*Time Frame:* 3-5 years
*Funding:* Federal and State grants; Local match
*Estimated Cost:* Unknown
*Staff:* Ogden City
*Jurisdictions:* Ogden City

***Action 3:*** Mitigate flooding on hot springs/sloughs

*Time Frame:* 3-5 years
*Funding:* Local funds
*Estimated Cost:* Unknown
*Staff:* County Engineer
*Jurisdictions:* Countywide

## Severe Weather

**Problem Identification:** Most disaster declarations are generated from weather related incidents. Weber County continues to be impacted by snowstorms, hail, thunderstorms/lightning, tornadoes, heavy rain and avalanche.

**Objective #1 (Priority MEDIUM):** Reduce impact to life and property from severe weather related incidents

***Action 1:*** Establish and support countywide National Weather Service (NWS) StormReady program

*Time Frame:* Two years
*Funding:* County Emergency Management
*Estimated Cost:* Dependant on scope of study
*Staff:* County Emergency Management, NWS Salt Lake City Forecast Office
*Jurisdictions:* Countywide

***Action 2:*** Identify areas of avalanche risk. Develop and post signs for avalanche danger

*Time Frame:* Ongoing
*Funding:* County Emergency Management, County/City Planners, County/City Engineers, Road Dept/Public Works
*Estimated Cost:* Minimal, for signs and placement of signs
*Staff:* County/City Engineers, Road Department/Public Works
*Jurisdictions:* Countywide

## Slope Failure

**Problem Identification: Weber County has a significant number of landslide hazard areas.**

**Objective #1 (Priority HIGH):** Re-evaluate current county landslide map

***Action:*** Update current landslide map and supporting data

*Time Frame:* Unknown; based on funding
*Funding:* Local and State
*Estimated Cost:* Unknown
*Staff:* County/City Engineering
*Jurisdictions:* Countywide

**Objective #2 (Priority HIGH):** Develop a county landslide pre-stabilization ordinance for landslide areas in the Norwood Tuff soils area of the Ogden Valley 6:1 or steeper.

***Action:*** Require land stabilization engineered design for properties subject to slope failure in identified risk areas.

*Time Frame:* Ongoing
*Funding:* County, Property Owners,
*Estimated Cost:* Unknown
*Staff:* County Engineer, Engineering Consultants, UGS
*Jurisdictions:* Jurisdictions prone to landslide hazard

**Objective #3 (Priority LOW):** Reduce risks from debris flow hazard

***Action 1:*** Add debris basins to master plans
*Time Frame:* January 2008
*Funding:* Local
*Estimated Cost:* Minimal
*Staff:* County Engineering, County Emergency Services
*Jurisdictions:* Countywide

***Action 2:*** Educate cities on debris basins
*Time Frame:* 1-2 years
*Funding:* Local
*Estimated Cost:* Minimal
*Staff:* County Engineering, County Emergency Services
*Jurisdictions:* Countywide

**Objective #4 (Priority HIGH):** Evaluate hazards to the Weber Aqueduct and develop a long-term mitigation plan.

***Action:*** Develop long-term mitigation plan.
*Time Frame:* 2-3 years
*Funding:* WBWCD, PDM grant, U.S. Bureau of Reclamation
*Estimated Costs:* Unknown
*Staff:* WBWCD
*Jurisdiction:* WBWCD

## Wildland Fire

**<u>Problem Identification:</u> The Wildland-Urban Interface (WUI) continues to be of concern in the Uintah Highlands, Wolf Creek, North Ogden and several areas in Ogden Valley.**

**Objective #1 (Priority MEDIUM):** Reduce potential impact to life and property in WUI areas

***Action 1:*** Develop and implement a strong land use ordinance that addresses fuel reduction in areas at risk from fire.
*Time Frame:* Ongoing
*Funding:* County/City Emergency Management, Planning and Zoning, County/City Attorneys, Public Officials
*Estimated Cost:* Minimal
*Staff:* County/City Emergency Management, Planning and Zoning, County/City Attorneys, Public Officials
*Jurisdictions:* Countywide

***Action 2:*** Encourage communities to participate in the Fire Wise Community programs
*Time Frame:* Ongoing
*Funding:* County Emergency Management, County/City Planners, County/City Engineers, Road Dept/Public Works
*Estimated Cost:* Minimal
*Staff:* Contractors, County/City Fire, Local participation
*Jurisdictions:* Countywide

***Action 3:*** Create County ordinance adopting 2006 Wildland-Urban Interface Code

*Time Frame:* 60 days
*Funding:* County funds
*Estimated Cost:* Minimal
*Staff:* Weber Fire District
*Jurisdictions:* Countywide

***Action 4:*** Urge cities to adopt the 2006 Wildland-Urban Interface Code

*Time Frame:* 60 days
*Funding:* County funds
*Estimated Cost:* Minimal
*Staff:* Weber Fire District
*Jurisdictions:* Countywide

**Objective #2 (Priority MEDIUM):** Organize community to reduce wildfire hazard

***Action 1:*** Create Wildfire Community Councils

*Time Frame:* 4-5 years
*Funding:* Utah Division of Forestry, Fire, and State Lands
*Estimated Cost:* Unknown
*Staff:* Weber Fire District
*Jurisdictions:* Countywide